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Western Mining in the Twentieth Century Series

BROTHERS IN MINING

Malcolm J. McPherson	Pioneering Computer Network Analysis in Ventilation; Teaching at Nottingham and Berkeley; 1965-1991
James McPherson	Development of Longwall Mining in the United Kingdom, 1940-1985

With an Introduction by
Michael Hood

Interviews Conducted by
Eleanor Swent and Malcolm J. McPherson
in 1990 and 1991

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Since 1954 the Regional Oral History Office has been interviewing leading participants in or well-placed witnesses to major events in the development of Northern California, the West, and the Nation. Oral history is a modern research technique involving an interviewee and an informed interviewer in spontaneous conversation. The taped record is transcribed, lightly edited for continuity and clarity, and reviewed by the interviewee. The resulting manuscript is typed in final form, indexed, bound with photographs and illustrative materials, and placed in The Bancroft Library at the University of California, Berkeley, and other research collections for scholarly use. Because it is primary material, oral history is not intended to present the final, verified, or complete narrative of events. It is a spoken account, offered by the interviewee in response to questioning, and as such it is reflective, partisan, deeply involved, and irreplaceable.

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Malcolm J. McPherson: mining family background, and school days, Scotland and England; working in Leicestershire coal mines, 1954-1957; education, Nottingham University, and years on faculty, 1965-1980; research in mine safety, computer analysis in ventilation, thermodynamics of large fans, control of air quality, underground disposal of radioactive waste; work with British National Coal Board, South African Chamber of Mines, and in Eastern Europe, Australia, Canada, and the United States; UC Berkeley Professor of Material Science and Mining Engineering, 1981-1982: teaching, research, restoration of Hearst Mining Building, student recruitment. James McPherson: development of longwall mining in the United Kingdom, 1940-1985; labor conditions in Scottish and English collieries; mine mechanization post WWII; mine management positions since 1954; the Coal Board, and strikes of 1974 and 1984.

Introduction by Michael Hood, Associate Professor of Materials Science and Mining Engineering, University of California at Berkeley

Interviews conducted 1990 and 1991 by Malcolm J. McPherson and Eleanor Swent for Western Mining in the Twentieth Century series. The Regional Oral History Office, The Bancroft Library, University of California, Berkeley.

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PREFACE

The oral history series on Western Mining in the Twentieth Century documents the lives of leaders in mining, metallurgy, geology, education in the earth and materials sciences, mining law, and the pertinent government bodies. The field includes metal, non-metal, and industrial minerals, but not petroleum.

Mining has changed greatly in this century: in the technology and technical education; in the organization of corporations; in the perception of the national strategic importance of minerals; in the labor movement; and in consideration of health and environmental effects of mining.

The idea of an oral history series to document these developments in twentieth century mining had been on the drawing board of the Regional Oral History Office for more than twenty years. The project finally got underway on January 25, 1986, when Mrs. Willa Baum, Mr. and Mrs. Philip Bradley, Professor and Mrs. Douglas Fuerstenau, Mr. and Mrs. Clifford Heimbucher, Mrs. Donald McLaughlin, and Mr. and Mrs. Langan Swent met at the Swent home to plan the project, and Professor Fuerstenau agreed to serve as Principal Investigator.

An advisory committee was selected which included representatives from the materials science and mineral engineering faculty and a professor of history of science at the University of California at Berkeley; a professor emeritus of history from the California Institute of Technology; and executives of mining companies.

We note with much regret the death of two members of the original advisory committee, both of whom were very much interested in the project. Rodman Paul, Professor Emeritus of History, California Institute of Technology, sent a hand-written note of encouragement just a few weeks before his death from cancer. Charles Meyer, Professor Emeritus of Geology, University of California at Berkeley, was not only an advisor but was also on the list of people to be interviewed, because of the significance of his recognition of the importance of plate tectonics in the genesis of copper deposits. His death in 1987 ended both roles.

Thanks are due to other members of the advisory committee who have helped in selecting interviewees, suggesting research topics, and raising funds.

Unfortunately, by the time the project was organized several of the original list of interviewees were no longer available and others were in failing health; therefore, arrangements for interviews were begun even without established funding.

The project was presented to the San Francisco section of the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) on "Old-timers Night," March 10, 1986, when Philip Read Bradley, Jr., was the speaker. This section and the Southern California section provided initial funding and organizational sponsorship.

The Northern and Southern California sections of the Woman's Auxiliary to the AIME (WAAIME), the California Mining Association, and the Mining and Metallurgical Society of America (MMSA) were early supporters. Several alumni of the University of California College of Engineering donated in response to a letter from Professor James Evans, the chairman of the Department of Materials Science and Mineral Engineering. Other individual and corporate donors are listed in the volumes. The project is ongoing, and funds continue to be sought.

Some members of the AIME, WAAIME, and MMSA have been particularly helpful: Ray Beebe, Katherine Bradley, Henry Colen, Ward Downey, David Huggins, John Kiely, Noel Kirshenbaum, and Cole McFarland.

The first five interviewees were all born in 1904 or earlier. Horace Albright, mining lawyer and president of United States Potash Company, was ninety-six years old when interviewed. Although brief, this interview will add another dimension to the many publications about a man known primarily as a conservationist.

James Boyd was director of the industry division of the military government of Germany after World War II, director of the U.S. Bureau of Mines, dean of the Colorado School of Mines, vice president of Kennecott Copper Corporation, president of Copper Range, and executive director of the National Commission on Materials Policy. He had reviewed the transcript of his lengthy oral history just before his death in November, 1987. In 1990, he was inducted into the National Mining Hall of Fame, Leadville, Colorado.

Philip Bradley, Jr., mining engineer, was a member of the California Mining Board for thirty-two years, most of them as chairman. He also founded the parent organization of the California Mining Association, as well as the Western Governors Mining Advisory Council. His uncle, Frederick Worthen Bradley, who figures in the oral history, was in the first group inducted into the National Mining Hall of Fame, Leadville, Colorado, in 1988.

Frank McQuiston, metallurgist, vice president of Newmont Mining Corporation, died before his oral history was complete; thirteen hours of taped interviews with him were supplemented by three hours with his friend and associate, Robert Shoemaker.

Gordon Oakeshott, geologist, was president of the National Association of Geology Teachers and chief of the California Division of Mines and Geology.

These oral histories establish the framework for the series; subsequent oral histories amplify the basic themes.

Future researchers will turn to these oral histories to learn how decisions were made which led to changes in mining engineering education, corporate structures, and technology, as well as public policy regarding minerals. In addition, the interviews stimulate the deposit, by interviewees and others, of a number of documents, photographs, memoirs, and other materials related to twentieth century mining in the West. This collection is being added to The Bancroft Library's extensive holdings.

The Regional Oral History Office is under the direction of Willa Baum, division head, and under the administrative direction of The Bancroft Library.

Interviews were conducted by Malca Chall and Eleanor Swent.

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Regional Oral History Office

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Western Mining in the Twentieth
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October 1990
Regional Oral History Office
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Western Mining in the Twentieth Century Oral History Series
Interviews Completed, April 1992

Horace Albright, Mining Lawyer and Executive, U.S. Potash Company, U.S. Borax, 1933-1962, 1989

James Boyd, Minerals and Critical Materials Management: Military and Government Administrator and Mining Executive, 1941-1987, 1988

Philip Read Bradley, Jr., A Mining Engineer in Alaska, Canada, the Western United States, Latin America, and Southeast Asia, 1988

Catherine C. Campbell, Ian and Catherine Campbell, Geologists: Teaching, Government Service, Editing, 1989

James T. Curry, Sr., Metallurgist for Empire Star Mine and Newmont Exploration, 1932-1955; Plant Manager for Calaveras Cement Company, 1956-1975, 1990

James Mack Gerstley, Executive, U.S. Borax and Chemical Corporation; Trustee, Pomona College; Civic Leader, San Francisco Asian Art Museum, 1991

John F. Havard, Mining Engineer and Executive, 1935-1981, 1992

George Heikes, Mining Geologist on Four Continents, 1992

Helen R. Henshaw, Recollections of Life with Paul Henshaw: Latin America, Homestake Mining Company, 1988

Lewis L. Huelsdonk, Manager of Gold and Chrome Mines, Spokesman for Gold Mining, 1935-1974, 1988

Arthur I. Johnson, Mining and Metallurgical Engineer in the Black Hills: Pegmatites and Rare Minerals, 1922 to the 1990s, 1990

Evan Just, Geologist: Engineering and Mining Journal, Marshall Plan, Cyprus Mines Corporation, and Stanford University, 1922-1980, 1989

Plato Malozemoff, A Life in Mining: Siberia to Chairman of Newmont Mining Corporation, 1909-1985, 1990

James and Malcolm McPherson, Brothers in Mining, 1992

Frank Woods McQuiston, Jr., Metallurgist for Newmont Mining Corporation and U.S. Atomic Energy Commission, 1934-1982, 1989

Gordon B. Oakeshott, The California Division of Mines and Geology, 1948-1974, 1988

Vincent D. Perry, A Half Century as Mining and Exploration Geologist with the Anaconda Company, 1991

James V. Thompson, Mining and Metallurgical Engineer: the Philippine Islands; Dorr, Humphreys, Kaiser Engineers Companies; 1940-1990s, 1992

Interviews In Process, April 1992

Samuel S. Arentz, Jr. (Escalante Mine), in process

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INTRODUCTION--by Michael Hood

This volume of the oral histories of the brothers James and Malcolm McPherson is an extraordinarily significant document. It catalogues as a first hand experience the transition of the underground coal mining industry from a position that was unbelievably primitive only fifty years ago to its current position as the most mechanized and advanced form of mining. This volume also is a fascinating description of the very different mining careers of two highly successful men born into a working-class family as sons of a Scottish coal miner.

In 1940, when Jim left school to start work in a Scottish coal mine at age fourteen years, mining conditions as he describes them were not different in any substantial way from the grim picture of French coal mines in the 1880s painted by Emile Zola in his classic novel Germinal. Jim talks of his early years on the mines when shaft accidents were so frequent that, to minimize tragedy in a single family, relatives were not allowed to ride in the same cage into and out from the mine. Many of the mines used "naked lights" (open flames) because safety lamps had not yet been mandated. Jim's first job underground was hand-pushing tubs of coal; the seam was not high enough to stand upright so these tubs had to be pushed all day from a stooped position. Later he progressed to drive the ponies that pulled the coal tubs in the main roadways. He describes hand drilling with ratchet drills, blasting with black powder that was ignited by a naked flame, building packs by hand for roof support behind the face, and a lack of ventilation in the working areas causing high concentrations of dust and gas. To an engineer graduating today it is unbelievable that mining conditions this primitive were prevalent only fifty years ago.

The McPherson family moved to England in 1943. Jim and Malcolm's father had risen to the position of undermanager; a position that he held at several mines. Their father was very interested in the development of new equipment and he instilled this interest in Jim. Jim recognized that if he was to progress beyond the level of manual worker in the mines he had to improve his education. He went back to school. At one point he was working night shifts, from 10:00 PM to 7:00 AM, hand loading coal. He had two evening classes which meant that he arrived home at 9:00 PM just in time for his 10:00 PM shift. In addition, on one day a week he took the bus in the morning from the mine to the local college where he studied from 9:00 AM. He arrived back home at 5:00 PM and had to be back on shift at 10:00 PM. Eventually his company granted him a day release so that he did not have to work on the day he was at college. His studying paid off. He went back to school at age eighteen and at age twenty-four or twenty-five he was awarded his manager's ticket.

The push for mechanization of coal mining operations followed nationalization of the British coal industry in 1947. Jim describes the operations and problems with some of the early machines, the Shelton loader, the Meco Moore, and the trepanner. Jim was promoted to undermanager in 1951 and to manager in 1954. He worked at several pits as manager during the period 1954-1968.

Jim continued to press for improvement in mining conditions through mechanization. He lobbied successfully to have one of the first Anderton shearers and armored face conveyors installed in his mine. He encouraged the development of hydraulic chocks. He improved coal haulage by installing the new method of skip hoisting. All of these technologies came together at the Nailstone mine while Jim was manager and this pit broke all production records. In 1963 Jim was appointed manager of Rawdon Colliery. Here again he was instrumental in advancing the science and engineering of coal mining. Rawdon was a large mine with many seams and with a considerable amount of face mechanization. Jim improved productivity by eliminating stable holes for the mining machines at the face ends. He introduced the efficient system of retreat mining and he employed continuous miners, imported from the United States, for roadway drivage.

In 1968 Jim was promoted to general manager at Rawdon Colliery and two years later he was promoted again to Area Production Manager for the Leicestershire Coalfield. He found that this new role which involved managing mine managers and dealing with trade unions rather than managing mine workers required different skills, but he adapted readily to these new responsibilities. He reorganized the mines for which he had responsibility; he worked closely with Bretby, the R&D arm of the National Coal Board, to improve the reliability of mining systems; and he developed a close relationship with the workforce through his contacts with the unions.

In 1974 and again in 1984 there were national strikes in the coal mines. The first of these strikes brought down the government, the second changed forever the character of the British coal mining industry. In 1974 Edward Heath was prime minister, the issue for the coal mine union was higher wages; it was widely recognized that the wages of coal miners were below those of other industrial workers. However, the conservative government was struggling to control inflation and they decided to take a stand against the coal miners. Soon after the miners went on strike the country began to suffer electricity shortages. Factories were constrained to operate only three days a week because of lack of power. Within six months the situation had reached an intolerable level. Mr. Heath was forced to call an election, which the conservative party lost. One of the first actions of the new labour party prime minister, Harold Wilson, was to settle the strike by agreeing to wage increases for the coal miners. Ten years later the issue was different. Many mines in the UK had exhausted their reserves of coal and pits needed to be closed. The stated concern of the union was job losses; however, it was widely held that the real motivation of the radical president of the National Union of Mineworkers, Arthur Scargill, was to bring down the prime minister, Margaret Thatcher, and her conservative government.

In the Leicestershire area Jim had already addressed the problem of pit closures through negotiations with the unions. He made sure that closures were announced well before the mine shut down and then, through a liaison committee, arranged for the workers either to transfer to another mine or to take redundancy on good terms. In consequence the Leicestershire miners did not support the strike and these mines continued to work throughout the strike. This brought on some very violent confrontations with pickets brought in from other mining areas. The government held firm, there was sufficient coal stockpiled that power shortages did not occur and, in the end, the strike collapsed. The union effectively was defeated. This gave Ian McGregor, who then was chairman of the National Coal Board, a free hand to shut mines and downsize the industry. Jim comments that the severity of these mine closures was much greater than would have occurred had there not been a strike.

The confrontation and violence of the 1984 strike caused Jim to retire as he approached the age of sixty. During his career he saw the introduction of the early attempts at coal mine mechanization, he encouraged and assisted the development of new mining systems and, by the time that he retired, coal was being won from highly automated faces in well ventilated mines under safe mining conditions, a far cry from the conditions which he experienced in his early mining days.

Jim's younger brother Malcolm followed a different career path in the mining industry. Malcolm was raised in mining communities and his father and brother both worked in coal mines. In those days mine accidents were frequent and in particular mine explosions were a common occurrence. These tragic incidents had a strong influence on Malcolm while he was growing up and he indicates that this led him in later life to devote his professional interests to the improvement of the underground mine environment and to improved worker safety.

Malcolm left school at age sixteen years and was actively discouraged by his father from embarking on a career in mining. However, the rapid career progress that Jim was making at that time made Malcolm determined to work in the mining industry. Eventually his father accepted this decision and Malcolm started working as a trainee in his father's mine. He furthered his education by taking classes one day a week (with a day release from his mining job) and at night at the local technical college. 1958 was a momentous year for Malcolm; he married the young Shirley Wass and he applied for and was accepted as an undergraduate student in mining at Nottingham University. Malcolm left his job at the mine to take up studying full time at the university but for the first two of his four undergraduate years Shirley stayed in the house of Malcolm's parents forty miles away and the newlyweds saw each other only on weekends and during school holidays. These efforts paid off; in 1962 Malcolm graduated with a first class honours degree.

The university had broadened Malcolm's view of the world and he had become more interested in research and teaching than in mine production. These ambitions were encouraged by Professor Hinsley, a noted authority in the field of mine ventilation and department head at Nottingham University. Malcolm stayed on to conduct graduate research at Nottingham with Professor Hinsley on the thermodynamic behavior of airflows through large fans and he was awarded his Ph.D. for this work in 1965. During the course of this work he became interested in the use of the new digital computers for airflow calculations. He was one of the first people to develop a computer program for modeling the airflows in a mine network. Until this time the complicated calculations needed for network analysis of this kind had been conducted using the much more clumsy analog computers. The digital computer approach was much faster and allowed much more flexibility in designing the network. These advantages persuaded the National Coal Board to employ digital computers for mine ventilation design. This development launched Malcolm to national, and later to international, attention as a leading researcher in the mining field.

Following the award of his Ph.D. Malcolm joined the mining faculty at Nottingham University as an assistant lecturer. As his career developed at the university Malcolm started assembling a team of faculty with interests in mine environmental engineering. He started traveling extensively, to the United States, to Eastern Europe, to South Africa, to Canada and to Australia. In the beginning these trips typically were to conferences to give papers. Later, as his reputation grew, he was invited to work overseas. One of these assignments was with the Chamber of Mines Research Laboratories in Johannesburg. Malcolm helped this organization in two ways. He installed a computer program to enable the mining industry in South Africa to plan their ventilation systems and, using work that he had conducted for his doctoral thesis, he demonstrated a method of testing the large fans used for ventilating mines. For this latter work he was awarded a gold medal by the Mine Ventilation Society of South Africa.

The relationship which Malcolm developed with the South Africans was mutually beneficial. He learned from them methods for modeling heat and humidity in underground workings. These methods, which Malcolm continued to develop, were to become very important in European mines as mine depths and the amount of mechanization increased causing an increase in the heat loads of the underground workings. Later Malcolm was to receive another gold medal for environmental planning, involving airflow quantities and control of heat and humidity, at the Boulby potash mine located in the north of England.

I first came to know Malcolm well when he spent a quarter on the Berkeley campus as a visiting professor in 1978. I remember that he taught a course on ventilation planning and that his teaching evaluations by the students were a perfect seven (out of a possible score of seven). I was impressed! During the quarter we used to walk across the campus at lunchtime and have a sandwich together in the general area of the Student's Union. Watching the "demonstration of the day" on the steps of Sproul Hall was always an entertaining experience.

I had only been at Berkeley a year at that time and I had become involved in a very large research project at the Lawrence Berkeley Laboratory involving the disposal of radioactive waste. Our concern was with changes in the behavior of the rock as the waste canisters subjected the rock to heat loads. Malcolm quickly became involved in the project. He developed a new experiment to monitor the changes in the flow of water into the underground openings by measuring airflows and humidities. Neville Cook also involved Malcolm in a study on respirable dust for the National Academy of Engineering. All in all we made Malcolm work for his living during that quarter.

Malcolm joined the regular faculty in our department in 1981. It must have been a traumatic decision for him to leave Nottingham where he had been since 1958 as an undergraduate student, a graduate student, an assistant lecturer, a lecturer, a senior lecturer, and finally a reader. Here he was leaving to come not only to another university but to another continent. We were very pleased to have him; he really strengthened and added depth to the fledgling mining program.

During his ten years at Berkeley Malcolm made many contributions. One of his these was to encourage the students to re-establish the student society which was founded at Cal back in the late 1800s, the Mining Association. With Malcolm's encouragement, in his role as faculty advisor, this society has gone from strength to strength. The list of honorary presidents over the past ten years reads like the Who's Who of the mining industry, with Don McLaughlin serving as the first honorary president. It is fitting that this year, 1992, the students have chosen their former advisor, Malcolm McPherson, to serve as honorary president of the society that he helped re-establish. The students organize many activities during the year. They provide support and encouragement to incoming freshmen and they are actively involved both with the local section of AIME and with the California Mining Association.

The demand for Malcolm's services to design ventilation systems for both underground mines and nuclear waste repositories grew quickly after he moved to California. This demand caused him to establish a small company, staffed by our graduates. This company has gone from strength to strength and it is now widely recognized as the pre-eminent group in this specialized, but vitally important field.

Malcolm continued to receive recognition by the industry which he has spent his life serving. In 1988 he was recognized as a Distinguished Member of the Society of Mining Engineers.

In summary, Malcolm will be remembered fondly at Berkeley for his enthusiasm with students, his love of research, and his drive to see his research applied in practice. However, the one thing which Malcolm did which will ensure that his name is long remembered in our department was to succeed in having the Hearst Memorial Mining Building placed at the top of the list of buildings on the Berkeley campus in need of earthquake remediation. This building, which indisputably is one of the architectural gems of the campus, is also one of the most dangerous from the viewpoint of seismic safety. Malcolm served on several committees concerned with buildings and construction on campus and, after years of trying, he was successful in having this building slated for renovation. This work will begin in 1995-1996 and will take two years to carry out. When it is completed not only will the architectural quality of the building be preserved in an earthquake-resistant form but the faculty and students will enjoy new modern laboratories and lecture theaters.

It is a little strange writing this introduction for Malcolm's oral history because most of these histories are recorded with persons who have retired and are reflecting back on their careers. Malcolm's career is still very much in progress, indeed it has taken on a new lease of life with his recent move to Virginia Polytechnic Institute and State University (VPI). We wish him and Shirley the very best of luck with this new avenue to his career. To me, Malcolm was and is a close and trusted colleague, to my family the McPherson's--Malcolm, Shirley and their children Malcolm and Alison--are dear friends. We will miss them now that they have moved from California but our friendship will remain.

Michael Hood
Associate Professor
Material Sciences and Mineral
Engineering

March 1992
Berkeley, California

Regional Oral History Office
The Bancroft Library

University of California
Berkeley, California

Western Mining in the Twentieth Century Series

Malcolm J. McPherson

PIONEERING COMPUTER ANALYSIS IN VENTILATION; TEACHING AT NOTTINGHAM AND BERKELEY; 1965-1991

Interviews Conducted by
Eleanor Swent
in 1991

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INTERVIEW HISTORY, Malcolm McPherson

Professor Malcolm McPherson was one of the first members of the advisory committee for the oral history series on Western Mining in the Twentieth Century. As a specialist in mine environmental engineering, he brought an important perspective to the advisory committee and to the question agenda for the oral history series. And in turn, the focus on oral history and his interest in mining history led him to interview his older brother James in 1990 on his distinguished career in coal mining in the United Kingdom. The resulting document, Development of Longwall Mining in the United Kingdom, 1940-1985, is included in the present volume.

At the end of 1991, Malcolm's decision to leave the University of California faculty for the Massey professorship at Virginia Polytechnic and State University made it imperative to document his career as it has unfolded thus far, even though there will doubtless be many more significant developments still to record. He is consulted worldwide for his expertise, currently applied not only for extraction of minerals, but for underground disposal of radioactive waste material.

His oral history begins in the Dickensian atmosphere of a row of miners' cottages in Scotland, and recounts his education and training in mining engineering, both on the job in British coal mines and at Nottingham University. He traces his growing interest in mine safety leading into ventilation, the study of thermodynamics of large fans, and pioneering work in computer network analysis and control of air quality.

The letter inviting Malcolm McPherson to be an interviewee was sent on 18 October 1991. After some discussions for planning, three interview sessions were held in his office in the Hearst Mining Building on the campus of the University of California at Berkeley on 30 and 31 October and 1 November 1991. He prepared meticulously for the interviews, and showed much consideration for the role of the interviewer. The tapes were transcribed by Lucy Musante, of Mine Ventilation Services, Inc., and the first editing was done by Professor McPherson himself, which greatly facilitated the completion of the volume in time for presentation at the May 1992 banquet of the Mining Association of the University of California, which he sponsored. Thanks are due to his wife Shirley for locating photographs while she was packing and arranging for a transcontinental move.

The introduction to the volume is by Professor Michael Hood, friend and colleague at the University of California. The tapes of the interview are available for study at The Bancroft Library.

Eleanor Swent, Project Director
Western Mining in the Twentieth
Century Series

Regional Oral History Office
The Bancroft Library
Berkeley, CA 94720
March 1992

Regional Oral History Office
Room 486 The Bancroft Library

University of California
Berkeley, California 94720

BIOGRAPHICAL INFORMATION

(Please write clearly. Use black ink.)

Your full name MALCOLM JOHN McPHERSON.

Date of birth FEB. 16. 1937 Birthplace LARKHALL, LANARKSHIRE, SCOTL

Father's full name MALCOLM McPHERSON

Occupation COLLIERY UNDERMANAGER Birthplace BIRKENSHAW, LANARK. SCOTLA

Mother's full name JEANNIE McLACHLAN

Occupation FULL TIME MOTHER Birthplace LARKHALL, SCOTLAND

Your spouse SHIRLEY WASS

Your children MALCOLM STEWART
and ALISON DAWN

Where did you grow up? LARKHALL, SCOTLAND and DERBYSHIRE, ENGLAND

Present community LAFAYETTE, CA.

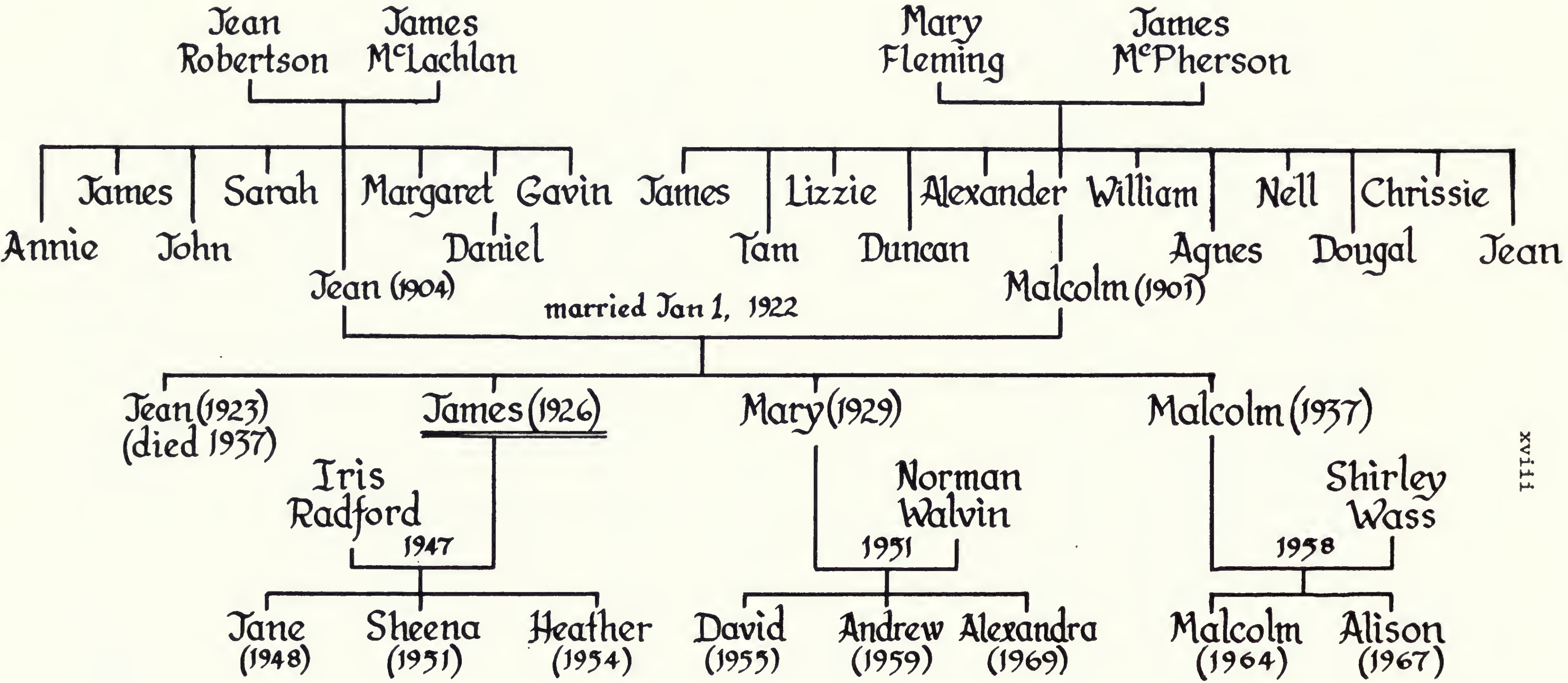
Education SWANWICK HALL GRAMMAR SCHOOL & HEANOR GRAMMAR SCHOOL, DERBYS, ENGLAND & THE UNIVERSITY OF NOTTINGHAM, ENGLAND.

Occupation(s) PROFESSOR OF MINING ENGINEERING & CONSULTANT IN MINE VENTILATION ENGINEERING.

Areas of expertise MINE VENTILATION & MINE ENVIRONMENTAL ENG. MINING METHODS.

Other interests or activities MUSIC, PHOTOGRAPHY

Organizations in which you are active SOC. OF MINING ENG (AIME)
INST. OF MINING ENGRS, U.K. INST. OF MINING & METALLURGY, U.K.
MINE VENTILATION SOC. OF SOUTH AFRICA.


Jean Robertson
James McLachlan
Mary Fleming
James McPherson
Annie
James
John
Sarah
Margaret
Daniel
Gavin
James
Tam
Lizzie
Duncan
Alexander
William
Agnes
Nell
Dougal
Chrissie
Jean
Jean (1904)
married Jan 1, 1922
Malcolm (1901)
Jean (1923) (died 1937)
James (1926)
Mary (1929)
Malcolm (1937)
Iris Radford
1947
Norman Walvin
1951
Shirley Wass
1958
Jane (1948)
Sheena (1951)
Heather (1954)
David (1955)
Andrew (1959)
Alexandra (1969)
Malcolm (1964)
Alison (1967)

1. EARLY YEARS IN SCOTLAND, 1937-1943

[Interview 1: October 30, 1991]##[1]

Swent: We're just beginning the interview and let's start with where and when you were born.

McPherson: That's a good place to start. I was born on February 16, 1937, in a little place called The Marlage. This was a tiny hamlet of miners' cottages near the coal mining town of Larkhall, in Lanarkshire, Scotland. That's the little row of miners' houses that my brother Jim referred to in some of the early pages of his oral history. They were all knocked down long ago now. But I remember going back quite a while after we moved to England and seeing one of the old neighbors. And those homes were tiny, tiny--you wouldn't even call them apartments. Just two rooms. There was a small kitchen about half the size of this room, maybe fifty or sixty square feet, and a room at the back which served as a living room--it served for everything else as well, including a bedroom. The beds were simply little recesses in the wall with boards on them. No electric lighting, just paraffin lamps, well water. In my home now, in Lafayette, I still have the brass paraffin lamp that provided light at my birth.

Swent: The walls were of stone?

McPherson: Yes. And there were six cottages in the row, six mining families who lived there. We came from coal mining families. Both sides of my family, mother and father's side were all in the coal mines.

Swent: Your grandfathers then were both miners.

McPherson: Yes, my grandfather on Dad's side was a coal miner right from, I think, his early days. I can't remember him. He died when he was sixty. He had his leg broken in the mines shortly before that. He never worked again.

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[1] This symbol (##) indicates that a tape has begun or ended. For a guide to the tapes see page 132.

Swent: At sixty. That was still probably considered rather old then, wasn't it? A lot of miners didn't live to be sixty.

McPherson: Yes. And my grandfather on my mother's side, he was a blacksmith at one of the local collieries. Colliery is not a word that is used much in the U.S.

Swent: That includes the mine and all of the shops and the whole plant?

McPherson: That's right, the whole thing. The coal mine specifically. So, Granddad McLachlan was a blacksmith in the Boag Colliery. I remember him well because we moved from The Marlage into Larkhall itself when I was still a tiny baby and we lived in the cottage--it was a row, again, of cottages--next door to my grandparents, and I remember Granddad McLachlan very well. He was such a strong fellow, a blacksmith all of his life, but he had problems with his legs. Again, a lot of these things are referred to in Jim's book. So he couldn't walk very well. He walked with two sticks, but his arms were so powerful, you know, he could lift things, and people learned not to shake hands with him because he just about crushed their knuckles.

Swent: A mighty smith.

McPherson: Yes, he was a great fellow, and all of my uncles on both sides were in the mines.

Swent: And generations before that I suppose.

McPherson: As far as we know, certainly back to our grandparents and probably well before that. Sometime during the nineteenth century both families, the McPhersons and the McLachlans, moved down from the Highlands of Scotland because of--oh, it's a long historical story--but because of tremendous poverty; a lot of deprivation in the Highlands arising from the violent history of that area, and a tremendous amount of persecution which resulted in the vast majority of the population being pressed into forced emigration to other countries. Those two particular families moved down south into the Lowlands of Scotland where there was much more work available. So there is a long historical background.

Swent: What about the women, the wives? They were bringing the water from the well, I suppose.

McPherson: In the place where I was born. I was a tiny baby when we left there so I can't remember that personally, but this is what I remember my Mother and Dad talking about, and my brother and sister. Yes, it was pretty primitive.

Swent: It must have been very hard for both parents, I'm thinking. A lot of hard work. They burned coal from the mine?

McPherson: They burned coal. I had two sisters and a brother. I'm the youngest of the family. My eldest sister, Jean, died just three weeks before I was born. Very sad, she died from pneumonia. And after Jean came Jim who is eleven years older than I am, and then Mary who is eight years older than I am, so there was a long gap between her and me. My earliest recollections personally were in Larkhall, living next door to Granny and Granddad McLachlan.

Swent: Was there lung disease?

McPherson: Obviously there was, Lee. But those are things that I don't remember even being conscious of in those early years before I became actively involved myself, much later on. Living in a mining community, one accepted those things, you know. There were tragedies, there were good times, there were bad times, there were accidents, there were deaths, but it was accepted as part of the way of life. I'm sure that, in no way, reduced the pain when these things happened, but it was just part of the accepted cost of living and working in a mining community.

Swent: You mentioned your grandfather's broken leg. Of course this is before you knew anything about it, but would there have been any kind of compensation?

McPherson: I don't think so, not in those days.

Swent: Just laid off, probably.

McPherson: Right, at that age anyway, there was very little chance of him coming back into the mines.

Swent: So the first thing you really remember was the time in Larkhall.

McPherson: Yes.

Swent: And this was a cottage, a row of cottages, again.

McPherson: Yes, a longer one, a larger community.

Swent: Similar construction though?

McPherson: Yes, just the same, with the kitchen in one room and the beds in the wall. It's funny looking back on it now.

Swent: What did you eat?

McPherson: Oh, my goodness.

Swent: Porridge, I hope.

McPherson: Yes, and with salt, not sugar. You're really taking my memory back. Yes, pretty plain fare but good. I mean, as I was growing up, I was never conscious of actually being hungry at any time. I think that my brother Jim does have that recollection but by the time I was growing up, my father, who was a coal miner, was studying through a correspondence course. He aspired to greater things in the mines rather than just being a coal miner like all of his brothers and other relatives. One thing I do remember about that was how difficult it was for him. Not simply because he himself had not had any kind of good or classical education that you and I would now recognize, but also because there was a lot of pressure on him, on anyone, not to move across the social barriers.

Someone from the working classes that wanted to be a manager or a controller in any way was looked upon with a lot of suspicion, both from his peers--why does this guy want to elevate himself and join the other side (as it were)--and also from the owners and managerial classes, who looked upon anyone who tried to get an education and become one of "them" as an upstart, so from both sides he had pressure not to do this. But, nevertheless, he had ambition.

Swent: How was this expressed?

McPherson: Well, I remember when my father got his undermanager's certificate, and that was while we were still in Scotland. At that time he was a deputy--you may remember that term from Jim's book--but it was, in fact, a foreman of a section of a mine at the Skellyton Colliery--at the time when he got his undermanager's certificate, and as soon as he got it he was fired. Luckily he obtained an undermanager's job at a very small mine in another part of Scotland. But it was not the done thing to educate yourself above your class in those days.

Swent: This news, of course, came home to you.

McPherson: Yes. Anyway, as we were talking earlier before we started taping, during that period also--remember this was during the war, 1941-1942--there had been a series of mine explosions in Cumberland, which is in the north of England. In particular, one I remember was at a mine called Whitehaven, which is up there on the northwest coast.

Swent: And this was after you had moved down to England?

McPherson: No, this was still when we were in Scotland. My father had always been very interested in rescue work. He was a very active member of the Scottish Mines Rescue Service. In fact, he was the leader of a mine rescue service.

Swent: Now how did he come to that? Was this something that depended on being elected or selected?

McPherson: No, it was simply a voluntary thing, as it still is now in the U.K., and also in the U.S. People volunteer to take part in these activities. It's very dangerous work. I myself took part in that much later on in England. Looking back on it now, for me it was a very valuable and necessary part of my training. But, anyway, going back to the situation then with Dad going down to assist in the rescue and recovery operations in the north of England, I remember him coming back from those excursions and talking about his experiences in rescue work. There are lots of little stories I could tell you.

Swent: Do.

McPherson: Well, things that were absolutely fascinating, some of which I saw myself much later on. For example, after an explosion he led a team of six men (that was and still is the normal size of a rescue team in the U.K.) into a part of the mine which was very heavily polluted with carbon monoxide. This is a very poisonous gas, and they were wearing breathing apparatus, of course. They were clambering over falls of roof and twisted girders that had been bent and smashed with the force of the explosion, and they went round this corner and there was a pit pony standing there upright. Its coat was steaming and wet as if it had been running in panic, and its eyes were shining. It was looking at them, and this was in the midst of all this debris, devastation and twisted girders.

I remember my father saying, "My hair stood on end underneath my helmet because there was no way that pony could be alive in that concentration of carbon monoxide and all the devastation around him, and yet there he was standing looking at us with its eyes shining." And he said that he went up to it (you can't talk with a rescue mask on your face), patted it on the side of the neck and it just keeled over and fell. It was, in fact, dead. And its coat was steaming because it had been burned by the passing flames of the explosion. But it was just standing there, still upright, believe it or not. That was one anecdote.

There were lots of other stories. But little things like that which varied from the fascinating and the hilarious (some funny stories) through to the tragedy of people losing husbands and fathers. I think there were seeds sown in my mind then that later made me want to take part in mine environmental work. I'm using a broad term for it now because it expanded much more later for me. Now whether that was just my small boy ideas of wanting to do something exciting like being a fireman or a spaceman, or whether it was a sense of the importance of the work that he was doing that was getting across to me somehow or other, I don't know. But much later, that was a subconscious drive in my mind that really channeled my career into the way that it has gone.

Swent: Your father must have found it rather demanding and exciting to do the work too.

McPherson: Yes, yes, though I can never remember him being anything other than very philosophical about it. It was work that needed to be done, that he had the background and training to do; therefore, there was no decision to be made. It was something that had to be done. He was there to do it, so it wasn't something that, you know, "Shall I or shan't I?" I think that philosophy was part of my upbringing.

Swent: And you've been able to carry it on.

McPherson: Well, as I say, I think it's been something in my subconscious that's been a guide and a driving force all the way through.

Swent: How much schooling did your father have?

McPherson: It couldn't have been very much.

Swent: Before he went on to this training.

McPherson: I don't remember him talking very much about his school days. I know he went to an elementary school in the Birkenshaw, again near to Larkhall. When he left that, I don't know. I would guess between twelve and fourteen years of age.

Anyway, let me move on. The family moved from that area in Larkhall in Lanarkshire across to a little village called Blairhall which is on the other side of the country in Fifeshire. This, again, was an active coal mining area at that time. This was because my father had a driving ambition to go to a larger mine and take control, manage a larger mine. And he got his larger mine on the other side of the country, but things didn't work out too well there. We were only there for a few months. I remember it well because it was over the winter period and that was a beautiful little mining village with lots of holly hedges. We lived in a small bungalow which was so much grander than the little miners' row that we had left. And at the bottom of the garden, just about 100 yards beyond, there was an old castle, a very old castle, hundreds of years old. I remember spending that Christmas there walking along the little country roads with these holly hedges everywhere and the red berries, the hoar ice sparkling, skating on the village pond--I remember that as a kind of quintessential Christmas.

Swent: And when was this?

McPherson: This was 1943, winter of '42-'43.

Swent: Christmas of '42 then I suppose.

McPherson: Right. And it was from there after that few weeks that my father first of all moved down to England to Pentrich Colliery in Derbyshire.

Swent: Now what was the effect of the war on all of these things? There must have been an impact.

McPherson: Well, it had a devastating effect on the whole country of course.

Swent: Mines were essential.

McPherson: Yes, my personal memories of the war up in Scotland--remember, in Lanarkshire we were not too far from Glasgow, which was a very large ship building area, military ship building was going on there.

Swent: Bombing?

McPherson: And there was bombing, yes, I remember that very clearly. We had air raid shelters in the field beyond our garden, but these were just kind of brick structures, and my father thought they were not so safe as the house we were living in. So, when the bombs started falling the kids, which were Mary, my sister, cousins and I were taught to dive under the beds--or dive under the boards that were the beds. And I remember clearly, that when bombs started falling, without any instruction we would automatically dive underneath the beds.

One night Granny McLachlan got very upset with the bombs. My mother went next door and brought her round to our house. She was on the point of fainting and my dad gave her a sip of brandy, which seemed to do the trick. A few nights later when the bombs started falling again we kids dived underneath the bed boards, and I remember Mother putting her head down and saying, "Are you all right?" And I said, "Yes, Mum, but can we have some brandy?" That was quoted back at me for a long while afterwards.

As far as the miners were concerned, yes, it was a so-called reserved occupation, which meant that miners were not accepted into the military. If you were already working in the mine then you had to stay there, you had no choice. And, in fact, my brother tried to join the Royal Navy but was turned down because he was a miner.

2. SCHOOL DAYS IN A MINING FAMILY, 1942-1953

McPherson: You couldn't move freely from one job to another. Apparently one had to go in front of some kind of tribunal if you were going to move from one place to another. And this was a problem when my father was contemplating moving down to England, particularly. But, anyway, he got that job in Pentrich and came down early '43. He was down there for two or three months, and then the rest of us went down and joined him.

Swent: A major jump wasn't it, from one country to another?

McPherson: Yes, it was.

Swent: Old enemy country at that.

McPherson: Yes. We were talking about this, Shirley and I, some time ago, and--

Swent: Is her background Scottish also?

McPherson: No, she's English. We didn't realize it at the time, but when we moved to California, which was '81, I was the same age as my father was when he moved from Scotland to England. And our kids were the same ages as we were at that time. Kind of a coincidence I guess. Anyway, I started school in Scotland, but the majority of my education, obviously, was in England. So I started going to school in Ripley, which is right in the middle of Derbyshire.

The first school I went to was Ripley Council School. The name sounds so antiquated now. It was a local public school and my recollections of going to school there after Scotland were rather mixed. First of all, I was a stranger because of my funny Scottish accent. The teachers assumed that I was familiar with some things they had done that I had never seen before. Also, there were some things I wanted to do and knew how to do but was prevented from doing. For example, in Scotland I remember the kids were taught real hand writing right from the early stage of learning to write, in other words, joining their letters up. Whereas in England, the kids start by printing separate letters before they learn to join them up. So, when I went to school first of all in England I had to unlearn how to hand write. And they made me go back to printing, which I found very strange. Anyway, I settled down there.

Swent: What were some of the other things?

McPherson: Another thing that I remember was simply the ways of expressing oneself. Not just the accents but the actual formulation of words. You know, a lot of the Scottish words come from European backgrounds, German, French and Scandinavian, so some of the words like kirk for church, pooch for pocket and schule (pronounced 'skill') instead of school, they must have sounded very weird to my new friends in those days.

Swent: Did they play the same games in the playground?

McPherson: Yes, pretty well. I was still quite small at that stage.

Swent: That wasn't a problem?

McPherson: No. And then when I was ten the system then and, in fact, for many years afterwards was that children were required to take an examination called the Eleven Plus. This was the examination that determined whether they would move to a grammar school, what we call high school here, or continue in the secondary education system. The grammar schools were the places where the university entrants later on were chosen from. The so-called secondary schools were kind of trade schools, you know. These were people who would be artisans, but not university graduates. The class social structure was still very strong.

Swent: Starting right then.

McPherson: Yes. I was fortunate enough to pass the Eleven Plus, so I moved then from Ripley Council School to Swanwick Hall Grammar School and that was a bus ride away. The school was about three or four miles away, so I used to have to catch the bus every day to school. This was when my father moved from Pentrich Colliery to Ripley Colliery, which, again, was a much larger mine.

In 1947, all of the coal mines in the U.K. were nationalized. They came under public ownership. We had a socialist government who nationalized a lot of large private companies including all of the utilities, electrical power generation, water utilities, communications, telephones, and the coal mines.

Swent: Was there much talk in your family about the -

McPherson: Nationalization? Oh yes, because my father was then at this very large mine, Ripley Colliery. He had control of all of the underground operations, and that mine was in difficulties, geological and technical problems, when he went there. I remember some very exciting times after he had reorganized the mine infrastructure and they started breaking records for coal production. He got the whole thing so well organized that it was breaking records day after day for awhile. The blue National Coal Board flag seemed always to be flying on the head gear. It was very exciting. That was about the time when I went to Swanwick Hall Grammar School.

Then he moved from Ripley Colliery to another large mine about five or six miles away called Ormonde Colliery. This was near the town of Heanor which is also on your map there. The same locality in Derbyshire. This was also the period when my brother, Jim, was studying and gaining his qualifications in mining. So, I had to move school then from Swanwick Hall to Heanor Grammar School.

Swent: Did nationalization affect your father's job at all?

McPherson: Oh yes, not so much in the day-to-day operations, but simply the methods of reporting and, obviously, the ownership. He was no longer working for a private company. He was working for this big amorphous thing called The National Coal Board, owned by the people, that was the big sign outside all the mines with the blue background and white writing--"This mine is managed by the National Coal Board on behalf of the people" or something like that. It sounds rather communistic, but that was how the structure was set up.

Swent: Did you feel that there was any resentment, reaction or any particular emotion about all this?

McPherson: It was accepted very readily with open arms by the miners themselves.

Swent: They thought it would be an improvement?

McPherson: They thought it would be an improvement, and it was welcomed by some of the younger managers like my brother who was up and coming at that time. Some of the older managers had shares in their particular companies so they were concerned about two things. First all, were they going to be recompensed? I know that it took about ten years for some of them to get their money back. And the other thing was, would there be an incentive to be productive and to do a good job when supervisors no longer had a personal stake in the company? I don't think that was apparent in the short term, although it was in the much longer term. The National Coal Board never really was able to pay its way fully over the years. Anyway, where have we got to?

Swent: I was just wondering, would there have been any change in this sort of feeling that you mentioned against your father's improving himself?

McPherson: No, I don't think he was conscious of that at all after we came to England. That occurred during the time when he was changing from being a mine worker to being a manager. But when we moved down to England he came as a manager so he was already "in" as it were. So I was never conscious of that in England. There was certainly a class syndrome throughout the whole of the U.K. and that is still there to some extent, although much less now than it used to be.

Swent: Which perhaps would affect the children as well. As the son of a manager were you different from the son of a miner?

McPherson: I can't remember being conscious of that at that age at all. No. It just didn't matter to me at that time.

Swent: Nor to your friends probably.

McPherson: Right. Anyway, that move to Ormonde Colliery--oh, a little anecdote. The first time I ever went down a mine was shortly after we moved down to England. I was, what, six then, and I remember my father taking me down Pentrich Colliery. That's the first time I'd ever been underground. I remember it clearly. I was absolutely fascinated by it. One of the things that stands out in my memory was walking along this underground opening, or airway, as we call it. I recall sitting down for a rest beside my dad, just the two of us. There was no lighting in any of the mines in those days except in the main junctions and at the shaft bottoms. He said, "Let's put our cap lamps off just for a minute. I want you to see how dark it is in the mine." So we put our cap lamps off.

Swent: What kind of lamps were they?

McPherson: By that time they were using lamps very similar to those they use today with the battery on the hip and the cap lamp on the helmet. So we put our cap lamps off and I remember being so conscious that I'd never really seen darkness before that. Even in the darkest night there is a glimmer of light. But underground it was just velvety black, there was nothing. I was a little bit nervous and my dad said, "Tell you what, try doing this." And we were sitting down with our backs against the rock wall on the side. He said, "Bring your hand up and touch your nose with your forefinger, and do it very slowly." I did it thinking this was no problem--and touched my ear. It was a little experiment to indicate how disoriented one became in that kind of blackness. I remember that so clearly.

Swent: Of course. It would be very dramatic.

McPherson: That was fun. Anyway, he went to Ormonde Colliery. I went to Heanor Grammar School then. I'd loved my time previously at Swanwick Hall Grammar School but I didn't do very well at Heanor Grammar School. Nothing seemed to work for me there. The physics teacher was an old grouch called "Joey" Hancock. I remember being very hurt by his sarcastic comments about stupid Scots when I was unable to do a homework on material that he had covered before my arrival. I dropped physics as soon as I could and that affected my progress later on. I was not happy there at all.

This was the time when Jim explains in his volume that power loaders were beginning to come into the longwall faces of the mines. I remember Dad taking me down Ormonde Colliery to see the first MecoMoore machine working. This was a giant--a really enormous thing, and I recall being impressed by these tons of coal, all being fragmented into large lumps and flying about all at the same time. But Dad and Jim were both very ambitious to see mechanization coming into the mines. They both pushed it very, very strongly. So that was part of my growing up years as well.

Another thing. The memories come back to me. The actual place where we lived was Loscoe, that's where Ormonde Colliery was, a suburb of Heanor. I still have a brother-in-law who lives there. When we were living there and those first experimental power-loaders started coming in, my father was out at five o'clock in the morning and came home at about nine o'clock at night, and then as soon as he went to bed the telephone would start ringing. There were always problems, parts breaking down and the roof coming in and all kinds of things. We used to chat about this so much, all of us, and he would talk about the things that went wrong and how they were fixed. Eventually my mother used to answer the telephone in the middle of the night to save Dad being disturbed from his sleep, and very often she was able to tell them what to do. When calls came from underground she would say, "Do this, do that, have you tried this, have you tried that?" And she'd tell the mine foremen what to do. We thought that was very funny.

3. TRIALS AND TRIBULATIONS OF FIRST JOBS, 1953-1954

McPherson: So I guess that really brings me to the time when I left school.

Swent: Okay, so you left school in -

McPherson: Fifty-three. I left school in July '53. And that was another traumatic experience. As I say, I didn't do well at Heanor Grammar School. The grammar school stream were those from whom the future undergraduates were drawn. But it was still a minority of grammar school people, maybe only about 10 percent that went on to university. Quite small compared with nowadays. And I was obviously not university material at that time.

Swent: What's the O-level?

McPherson: Well, there were two levels of grammar school examination. The ordinary level of the General Certificate of Education was the so-called O-level. One took that at sixteen, or approaching sixteen, and if you did well on that--you took maybe eight, nine subjects at O-level--and if you did well on those then you were allowed to progress into the sixth form of the grammar school where you spent another two years preparing for the advanced level of the GCE (General Certificate of Education). On the basis of those A-level results, one either went to university or teacher training college or whatever. So, there were two times of leaving the grammar school, either at sixteen after the O-levels or continue for another two years. And it was pretty obvious to everyone, my teachers and myself, that I was not going to progress beyond the O-level stage. I only passed three O-levels: math, English language, and biology. Why biology I'm not sure. But all the others I failed, miserably.

Swent: What would the others have been?

McPherson: Oh, history, geography, physics, chemistry, English literature, French, Latin, both of those languages one had to do in grammar school in those days. So, the question then was what was young Malcolm, who was not very bright, going to do with his life? Having been brought up with that background we've been talking about.

Swent: Super achievers.

McPherson: And having seen my brother do so well, getting qualified and just racing up through the promotion ladder in the coal industry, I wanted to follow those footsteps. I was excited by it. It was in my blood and I'd seen my father and my brother being successful at it. It was everything we talked about, I'd lived in mining towns all of my life, never seen anything else, so all I wanted to do was to go down the mine and be a miner, and maybe one day I could get qualified as well. My father and mother were adamant, no way is the younger son going into mining. That was it. They'd seen the hard times. The really hard times.

I didn't realize it until I interviewed Jim, that he earlier went through a very similar experience to my own some years later. He also wanted to get into the mines and he was taken for an interview some place he didn't want to go and he failed it. Exactly the same thing happened to me. My father dragged me along to a large bank (Barclays) in Nottingham which is a nearby city. Nottingham is right next door to Derbyshire. He was trying to convince me that I should go in for accountancy. I should go in for a white collar job and I shouldn't get my hands dirty. I should be "respectable," and not become a coal miner.

This is something else I recall clearly. I had to sit this little math test at the bank, and to get to the room where I was to take the test my father and I walked through a long chamber. It was like something out of a Dickens novel with what seemed to be exorbitantly old gentlemen sitting up at high desks, apparently just adding up rows of figures. I thought, "No way am I going to be doing that for the next forty years." So I went on to the test room. Remember that math was one of the few subjects I had passed at school. On the test paper there were trivial things, little additions, subtractions and multiplications and I quickly realized that what I had to do here was just put down the wrong answers, because if I passed, my father would have forced me to go to work there. So I just made a mess of the whole thing. Of course that fell through.

Then he took me for another job. He thought I might be a reporter. He took me to one of the local newspaper offices for an interview. My lack of enthusiasm did not impress them either. Eventually we compromised and I got a job, not in the mines, but at the local headquarters of that area of the National Coal Board (NCB).

At that time all of the coal fields in the country were divided into divisions, and each division was divided into a number of administrative areas. I got this job as junior finance clerk at Eastwood, NCB Number 5 Headquarters, and that was in the East Midlands Division--a long title. Actually, Eastwood was quite famous because that's where D. H. Lawrence was born, the famous author. His notorious novel, Lady Chatterley's Lover, was set in the Eastwood countryside.

So, I got a job as a junior finance clerk at Eastwood. That was pretty hilarious as well. I started going to night school taking accountancy classes but I really couldn't generate any interest in it. All I was doing during the day was adding up pounds, shillings and pence lists of stock items that had been used in the local mines. It was excruciatingly boring. All of the people there were older than me for a start, and they all had these little purely mechanical adding machines. You might remember those.

Swent: I was trying to remember what the computing or calculating equipment was in those days.

McPherson: They were called facits. They were purely mechanical with a little turning handle at the side, and those that we had were for the pounds, shillings and pence that were used before the decimalization of currency in the U.K. So they used to punch in the value, turn the handle, and then punch in the next one.

However, I was not allowed to use a facit because I was a young trainee.

The head of the department was a man called Guy Tutt. I remember him well. And his philosophy was that you had to learn to add up in your head so I was not allowed to use the machines. I had to do all this adding up of long lists of pounds, shillings, and pence in my head because it was good for my soul. Of course I kept getting them wrong all the time so I had to keep doing them and over again. Talk about cruel and unusual punishment! So between that and having to go and fetch the tea for everyone from the canteen morning and afternoon, as the old British tradition had it, it was not really the best period in my life.

Swent: What were you paid?

McPherson: I remember the starting salary was two pounds, seven shillings and sixpence per week, which would be about $5.00 per week in those days. It seemed like a fortune at the time. Of course the tradition was that you had to give over all of your pay packet to Mum and she gave you a shilling or two shillings return pocket money and that was it. And actually I did that right up until I was twenty-one.

Anyway, there was I working at Eastwood. I stuck that for a year before it came to an abrupt end. I've got another little anecdote for you about that. Jim, my brother, who by that time had his first undermanager's job (that's second to the manager of the mine) was obviously going places rapidly. I remember him and his wife, Iris, coming over one evening. There was I still in my sixteenth year, with Dad trying to be boastful on my behalf that I was not roughing in the mines; I was going to have a much better life than he'd had or anyone could have in the coal mines, and I remember Jim listened to all of this, nodding his head.

Then my father said, "You know, if Malcolm keeps going on the way he is" (little did he know how bored and frustrated I was by the whole thing) "if Malcolm keeps going on the way he is, one day he could be secretary to the Area General Manager." That was the top of the whole administrative tree in the area.

I can remember sudden quiet in the room and the expression on Jim's face as he said, "Yes, Dad, and I might be the AGM."

And that was it; I didn't say anything but I thought, "That's it, no way am I ever going to continue with a job whose ultimate pinnacle is to be my brother's secretary." And the following week I just gave my notice in at Eastwood. I finished, I quit, without asking my dad's permission. I didn't talk to anybody about it, I just quit. And I went to one of the local mines, a mine called Woodside Colliery. Dad was still at Ormonde. I went to Woodside Colliery and got a job there as a trainee.

Swent: You were still just sixteen.

McPherson: I was a year at Eastwood so I must have been seventeen by then.

Swent: And you were able to do this?

McPherson: Well, I just did it. And then I told Mum and Dad that I'd started at Woodside Colliery and my father just went through the roof. That was kind of trying for a while. I had three months underground training as a miner at Woodside Colliery. This was the mandatory training period at that time, three months, during which time my father came around. He could see that I was determined and I wasn't going to change my mind although he'd put all kinds of pressure on me during this time.

Eventually he accepted it and he said, "Well, if you're going to be trained in mining, we're going to make sure it's done properly." So he said, "Come to my mine." So I went to Ormonde Colliery and really, in hindsight, it was a mistake to work in your father's own mine. Initially, he was over-protective, I think, but I had all kinds of silly jobs. Well, not silly jobs, but jobs that to me seemed less important at the time. Soft jobs as I called them. I had to take dust samples around the mine in various places, air samples, pulling gas samples from the waste areas of the mine for analysis. I was the rat catcher. I used to have to put poison down. They weren't rats actually; there were mice underground at that mine but I was called the rat catcher. What I wanted to do was to get trained in face and other mining operations but Dad insisted I do these silly jobs. I felt stupid because there was the undermanager's son obviously doing trivial work. That didn't last very long.

4. WORKING IN THE LEICESTERSHIRE COAL MINES, 1954-1953

McPherson: This was during a period when brother Jim had moved from Derbyshire to Leicestershire for his first senior managerial job. And it was only a few months after that that we followed.

My sister, Mary, had got married in the meantime. So we moved down to Leicestershire as well, and I started work -my father went to Ellistown Colliery--and I started work there also. Right from the first day at Ellistown Colliery I had made it very clear to my father in conversations that I wanted to work and to train as a miner and not as anything else. So I was there from--where are we now?--this was '54 to '58. That's right, I left school in '53 and had a year at Eastwood so that's right, '54 to '58, I worked at Ellistown Colliery. And I went through just about everything then including face operations. I did my longwall face training in the Lount seam. This was higher than the faces at Ormonde, some of which were only eighteen inches high. They were pretty cramped, but one got used to it.

Swent: They had longwall machinery that would work in a seam that small?

McPherson: No, at that time at Ellistown Colliery it was still so-called conventional mining, undercut, drill and blast. It wasn't until just as I was leaving, just after I left actually, about '59, that the machines that we'd had in Derbyshire started to be used in Leicestershire. They were rather slow in getting started on mechanization in that area.

Swent: So as a beginning miner, what were you doing?

McPherson: I went through just about everything you can think of. Working on the longwall faces, undercutting the coal with the old fashioned kind of jib coal cutter, drilling and blasting the coal and filling it out. A typical stint (length of face per man) was about fourteen tons, so we had to load that out by hand, shovel onto a face conveyor, put our own props up, the whole thing.

I remember another incident during my training days on the face. It wasn't in the low seams, it was in the higher one, the main seam. It was towards the end of my face training period. During the face training you worked with another miner, an experienced miner, and gradually you got to load out more and more lengths of coal between the two of you. I remember that right towards the end of that period the normal stint was seven yards, and for some reason the face had got a bend in it. So the two of us were asked to work at the end of the face, and take about ten yards of coal off to straighten the face. Actually we needed about twenty or thirty yards to straighten the whole thing up. No one else was on the face. Everything went beautifully that day. We just kept going and going and we took the whole thing off. We must have done something like twenty-five yards of coal between us. I felt like I could have filled out the whole planet. I was much fitter in those days. So that was the end of my face training. After that I was on my own, working on the face and all kinds of other operations, enlarging crushed roadways, driving tunnels and development faces underground.

One of the things that I remember becoming conscious of was that my father's attitude changed quite dramatically from what it had been in my first year when he put me on soft work. It went to the other extreme. I think what had happened there was that some of the miners--labor relations was always a problem--some of the miners were circulating rumors that I, his son, was being paid more than they were for the same work and he was showing some favoritism. None of this was true but he was conscious of the miners' perceptions and began to take pains to ensure that he could not be accused of showing favoritism.

There was one rather nasty incident on a Friday afternoon just after I had drawn my wage packet. There was a miner who was notorious for aggressiveness. He was about twice my size and weight. With a ring of his buddies around him, he demanded that I show him my wage slip. This grated on my Scottish pride and stubbornness and I refused. After some heated argument, I realized that I was not going to get out of this, so I offered to trade wage packets with him. I had no idea what was in his. He glared at me for a few seconds, then stomped away.

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McPherson: So Dad went to the other extreme. Instead of looking after me, I tended to get sent on the nastier jobs. Through those years I always had to work through what we called the pit holidays. This was a two-week vacation period when the whole of the mine was closed down except for safety occupations and special tasks. During these two weeks, a lot of jobs that were not possible to do during the normal working period had to be done. I always had to work during the two-week vacation period. Things like installing pumps in flooded-out areas or reinforcing the roof in dangerous areas. This kind of thing, but it was interesting and challenging.

Swent: Reverse discrimination.

McPherson: It really was. It went to the other extreme. I remember a time during one of these mine vacation periods, when there was a district in the mine, a longwall district, that was a long way out and only had a few weeks to go before it was finished.

They were all single-entry districts, one intake and one return. The intake airway was fine but the return airway coming back the other way was in bad condition. It had become very low. The roof was in a poor condition and the airway had a swilly (a low point) in it. There was quite a water make in that district and this dip was filling up with water and we couldn't get power to it to drive a pump. So the mate that I was working with, called Joe Fowkes, I remember him well, a great guy, we were given the job of getting a three-foot diameter steel pipe threaded through from one end of this dip to the other just so that ventilating air could keep flowing, you know, the water could build up around the pipe. During the two-week holiday when there were few miners underground, the mice (remember there were mice underground) used to get hungry and become very, very cheeky. I was lying down with my legs and feet on dry land but from the hips upwards, I was stretched forwards and downwards. I lay on a board across my chest and a board across my hips and there was water underneath me. My helmet was just a couple of inches from the roof and with just that much space I was pushing this duct, and Joe was at the other end pulling it. There we were struggling and making appropriate comments when, all of a sudden, a mouse ran straight up my trouser leg. Oh dear, I just reacted involuntarily. You know, my head came back, hit the arch girders, my stomach dropped into the water. The boards I was lying on broke and my whole body fell into the water.

Swent: It's a wonder you didn't drown, isn't it?

McPherson: Well, it wasn't deep, it was just very uncomfortable. But I remember Joe shouting, "What's the matter, what's the matter?" He thought I'd got into an accident. I was screaming incoherently about this mouse up my trouser leg. Lots of little stories like that.

I like to remember the funny incidents. But the realities of mining were always close by and I experienced much of it. On one occasion, the banksman at the top of the main hoisting shaft fell down the shaft. Recovering the body from the mud-filled sump was not a pleasant experience. Another time, a coal cutter operator was caught by the cutter chain and was dragged around the jib under the coal face. There was nothing left that was recognizable.

I think the really important things that have stayed with me all through my life began with being in a mining family. But they were reinforced time after time by working with miners; how close they are to each other. I know I've seen it all over the world, in many countries now. I think it arises from working and living in a dangerous occupation, having to look after not only yourself but the fellow next door as well. I've seen so many cases of this, you know, people doing dangerously silly things just in order to help somebody else out. I've done it myself without even thinking about it. One gains a sixth sense, I think, when to do things, when not to do things. I have jumped out of the way for no reason at all on several occasions just before a piece of roof has come down. Something triggered a reflex action, maybe I heard or felt something, I don't know, but you can't rationalize it afterwards. I've been pushed out of the way by other people, including my father-in-law, just before something happened. And anyone who has worked as a miner in underground mines will tell similar stories. It's that sense of belonging, it's that sense of looking after the next guy and him looking after you that has had a really significant effect on how I've behaved towards others I think, professionally, throughout the rest of my life. I'm philosophizing now.

Swent: I'm sure that's true though; the danger heightens it undoubtedly.

McPherson: So, where were we? Oh yes, during this period I had permission, as some others did, to have one day per week away from the mine to attend a local technical college.

Swent: How many days a week were you working?

McPherson: A five-day week at that time, alternating with six days. We used to work Saturday mornings as well every other week. So it was five-six, five-six.

Swent: So it was one of those five and a half days that you could take off?

McPherson: Yes, and during this period I was working all kinds of shifts, day shift, afternoon shift, night shift, whatever was necessary.

Swent: The mines worked around the clock.

McPherson: Oh yes. So, I had one of these days off to attend Coalville Mining and Technical College. Coalville, that's the town near where my brother still lives now, in retirement. I started taking classes there, fairly elementary stuff. And it was really pretty easy for me, having been to grammar school some years earlier. At least, to begin with it was quite easy, so I did pretty well in these classes. The head of the mining department at that school was a Welshman called Johnny Morris, W.J. Morris. He was a graduate of Nottingham University. He had done research under a man called Baden Hinsley, Professor Hinsley.

After I had been attending Coalville Tech for a couple of years and gained some good examination results, I remember Mr. Morris, as he then was, sending for me to go to his office at the college. He started talking about university, which was not at all in my mind. What I was intent on doing was to go through what we called the technical college stream, which was the way my brother had done it, gain my professional qualifications through the hierarchy of managerial certificates, and work my way up the ladder of colliery management, which is what my father and my brother had done very successfully. That's what I wanted to do. So when he started talking to me about university, I really wasn't all that interested. But he knew of my fascination with the underground environment, and by this time I had become an active member of the Mine Rescue Service. I became fully qualified in that and took part in rescue operations. I have some stories about those.

Swent: I do want you to tell those.

McPherson: Okay, let me finish what I'm saying. Johnny Morris knew all about my background. So he started talking about Professor Hinsley. I'd heard of Hinsley because he was the world expert, certainly as far as Europe and the old Commonwealth countries were concerned, in mine ventilation. And Morris told me about the work he'd done with Hinsley. He said that I should think about going to university because in the future it's not going to be enough just to have a manager's certificate, "You're going to need a degree, you know, in this new, bright but technically challenging world that's coming up." He convinced me that it was worth doing some extra studying in order to get the entrance qualifications to go to university.

So in those last two years, 1957, 1958, the latter half of '57, '58, I was still having my one-day release from the mine, going one full day per week, but every night, Monday through Friday, I was taking extra O-level classes, taking those same classes that I'd bombed out on in grammar school several years before, particularly the physics, chemistry and additional math and science-oriented subjects.

Swent: Where were you taking those?

McPherson: At the same college, Coalville. And Johnny Morris was great. He actually put on special tutors for me. I had a one-to-one relationship in physics.

Swent: And you were able to rearrange your work schedule to do this too then?

McPherson: No, I still had my one day off per week and that was it. They did help me in that during that period they let me stay on day shift only so I was able to go to classes every night. So I was going to college five nights and one day and then working four days or four and a half days in the mine. And I became engaged to Shirley during that period although we had little time together. But anyway, I passed those examinations and applied to several universities.

The system in England was, and still is, in most cases, that you have to go for a personal interview to the universities you're applying for. It's not quite so automated as it is here. My first interview was at Nottingham University, and Baden Hinsley did all the interviewing himself, the head of the department. I remember that interview very well. Firstly, because I was completely over-awed with this international figure that I'd heard so much about and was meeting for the first time. And, secondly, I had a lot of nervousness about my academic capabilities--am I going to make this or am I not?

But he really put me at ease, and I found out afterwards that he had started in the mine right next door to Ellistown, Bagworth Colliery, when he was twelve or thirteen, way back. And he had a very strong practical background himself. So rather than being interviewed about academic matters and whether I should do this, that, or the other course, he just chatted about the work I was doing in the mine. He was obviously very knowledgeable about it and the mining methods. I remember his parting shot as I was going out the door. He said, "One thing more, Malcolm," and that sort of hit me because you didn't use first names in those days in England, it was always mister or sir or whatever. He said, "One thing more, Malcolm, it's nice interviewing someone who knows one end of a pit prop from the other."

And I thought, "Great, I'm in here." So I was accepted and that was in 1958. I never did go for interview to the other universities. Shirley and I were married in July 1958, and I went off to Nottingham at the end of August, having to leave Shirley behind, unfortunately.

Swent: You went to Nottingham?

McPherson: I went to Nottingham University. And Shirley stayed with my parents because they had a large house then. I used to come home, it was about sixty or seventy miles away, no, less than that, about forty miles away, and I used to come home at weekends by bus. No cars in those days. Students couldn't afford cars then. So we had our weekends together. We had two years apart. During the vacations, of course, I used to go back home and work in the mines.

Swent: Was Shirley's family connected with the mines also?

McPherson: Oh yes, that's another story, how Shirley and I met. Actually, our families knew each other long before Shirley and I met. There is a tie-up here with one of the things that Jim refers to in his book when he met his wife, Iris, during the war. They used to go to dances at a little drill hall, the Army drill hall in Ripley. And Jim made friends with two brothers, Geoff and Graham Wass. Graham was working in the mines, Geoff was in the Royal Navy, and their father was also in the mines. We sort of lost contact with them after Jim got married, moved out and went his own way.

It wasn't until later when my father was at Ormonde Colliery he found that Jack Wass, the father, was working at that same mine. My mother spent a lot of time in hospital in those days. She wasn't very well and had several operations. And I remember Jack used to come and help in the garden occasionally.

I was still at school. I came home one day and there was a step ladder set up against one of the windows and there was this gorgeous little girl at the top of the ladder cleaning the windows. I thought, "Who on earth is this?" She didn't know who I was either. Didn't know there was a young man living in the house. This was Jack's youngest daughter. And that was it, we met up a ladder. That was Shirley whom I met and eventually married in 1958. I'm going backwards and forwards here. You'll have to sort this out.

Swent: That's okay. You do need to tell the Mine Rescue stories.

McPherson: Oh, there are lots of things there, yes. I did my initial training at Ashby Rescue Station, which is one of the largest mine rescue stations in the Midlands. This was in Leicestershire. Very rigorous training, including a lot of underground work, initially with mock fires and getting people out of very tight situations. After that I became a permanent member of the Ellistown Colliery Rescue Brigade. Each mine had its own rescue brigade.

Swent: Was the gear similar to what they use now?

McPherson: No, it was very different. The type of apparatus that's used in the United States nowadays uses compressed oxygen. We used the Browne-Mills liquid air apparatus.

Swent: Very heavy.

McPherson: I think they were about forty-two pounds before charging with liquid air. The ones nowadays are much lighter.

Swent: I saw a mine rescue contest just a couple of years ago up at Lead, and watched it so I know a tiny bit about how cumbersome it looks.

McPherson: Okay, the apparatus that I was trained on used liquid air. They had a big liquefaction plant at Ashby Rescue Station, and it was simply that. It was air that was cooled down until it becomes liquid. The backpack was heavily insulated, of course. We poured the liquid air into the absorbent material in the pack. Quite heavy. So I did all my rescue work on that. Saw quite a bit of action, with fires both while I was working at Ellistown and also when I came back on vacation periods in the summer from university.

We had one very large fire at Bagworth Colliery, which was the mine old Baden Hinsley had worked at, next door to Ellistown. I happened to be working there that particular summer as a shot firer. This was the man who put the explosives in the drill holes and blasted the coal down. One Monday morning not long after I started there during my first university vacation the deputy of the district (he was a great old guy) came around and said, "There's a strange smell down in the corner of the section." So I went down there with him. It was where some old workings had gone off to the side. I recognized the smell as what was known colloquially as gob stink. This was an indication that some sort of spontaneous combustion had started deep in there. So we organized some air samples to be taken. I don't think anyone made any big deal of it at that time, but the smell got stronger and stronger right throughout the week.

On the Saturday afternoon, Shirley and I had arranged to go into Leicester, the capital city of Leicestershire, to do some shopping and we told my mother where we were going and what we were going to do. We went to a cinema in the evening, some movie that we wanted to see, I forget what it was now, but I remember a public announcement going out half-way through this film, asking Malcolm McPherson to report to the manager's office. I went back there and received a message to go home immediately. At home, there was more news that there was smoke in the main returns at Bagworth. This was a Saturday night.

I received a call from Bill Statham, the area production manager. Would I organize two brick layers from Ellistown Colliery? I knew the work force at Ellistown very well, having worked there for several years. So I had to use my dad's car to go and get two brick layers that I knew personally out of their beds in the middle of the night. I drove them to Ellistown pithead baths where they changed into their pit clothes, then on to Bagworth Colliery. I went down the mine with them in the small hours of Sunday morning.

I was there till Tuesday morning putting on stoppings. There were a lot of connections into those old workings. Some of my old friends came down from the Ashby Rescue Service with breathing apparatus. We got everybody out, luckily, but lost a lot of equipment. That was the last time I wore rescue apparatus in earnest. And there were lots of other things. Some other things that I really don't want to talk about.

Swent: The danger is from the gas and from the fire.

McPherson: Yes, mainly carbon monoxide, which is so very poisonous. That's the main danger.

Swent: That's the gas.

McPherson: Yes. Lots of gases are produced during mine fires, but carbon monoxide is the most dangerous one in coal mines. So that's the one we have to watch for all the time. In those days we still used canaries underground to test for carbon monoxide. Another funny little anecdote. I prefer to tell the funny stories. At Ashby Rescue Station they had this big aviary with lots of canaries in it. There must have been hundreds of them. We bred them there. And we used to get a lot of visitors coming around; people always seem to be fascinated by mine rescue work. One of the standard demonstrations that we did was to show how a canary was affected much more rapidly than a human being by carbon monoxide. So the idea was, as far as the visitor was concerned, that we had a canary in a cage and we'd get a cylinder of carbon monoxide, push the little gas feeder tube in against its beak and give it a few whiffs of CO (carbon monoxide). The bird would flutter its wings and fall over with its legs in the air and be unconscious for a minute or two and then come round again. But what happened there was that we always used the same canary. This canary got so used to the procedure that it realized what was required of it. And before we got the tube against its beak it would flutter its wings and fall over backwards before it got the slightest whiff of carbon monoxide!

Swent: You had trained it.

McPherson: He trained himself. That bird was no fool. So I guess that really takes me up to the time when I became a full time student at Nottingham.

5. UNDERGRADUATE AT NOTTINGHAM UNIVERSITY, 1958-1962

Swent: Were you taking just the regular course then or were you able to short-cut some of the things because of your work experience?

McPherson: Well, that was something that was quite interesting. My first year at the university was something of a trial. The degree course in all of the engineering subjects was three years, and that was for people who were going in from school with three A level examination successes. Maths, physics and chemistry. And I didn't have any of those at A-level. All I had was my original three O-levels, plus additional O-levels in physics, chemistry, and additional math that I obtained through these additional evening classes. So I was not up to the academic level of going directly into the degree course. But they did have what was called, oh, what was the term they used, a preliminary year. It was a kind of remedial year, anyway, that I was put into, and I had to spend that year coming up to A-level standard in those three primary subjects, maths, physics, and chemistry. So I had to do in that one year what people normally took two years to do at high school or grammar school. That was tough because most of my colleagues, peers, in that year, in that class, did in fact have some A-level experience.

They don't call regular faculty professors in English universities. The term is reserved for the head of the department and a few very senior faculty. The others are lecturers, senior lecturers, or readers. The lecturers in my preliminary year were simply using strange terms and I had no idea what they meant. Things like "polynomials" and "series expansions," things that are very basic to higher mathematics, but I'd just never heard of them before. So they were using these terms and I remember figuring out after a while what each of these terms meant in turn, and thinking, "Well, I knew what it was, I just didn't know the word he was using." That was a tough year.

Swent: And you were working at the same time?

McPherson: No, this was full-time studying now.

Swent: But weekends you were working?

McPherson: No, this was full time at university. This was my first year at university full time. I had left the mine by that time. I remember Shirley and I going to see Johnny Morris one weekend I was home, my old head of department at Coalville, and related to him how terrible it was and I wasn't going to make it. He was a great help and provided a lot of encouragement for me. I got through it, and after that I got into the degree course proper where I was doing engineering subjects rather than pure science and mathematics only; then I went very rapidly. Then my experience in the mines really, really paid off. In fact, I was shining then because the other guys in the class had come straight from school. So it was kind of easy for me after that.

Swent: You had wonderful examples of mentors, I take it.

McPherson: Yes, and I was in a small class. The mining industry is very cyclic. It goes up and down with market fluctuations and what's happening in national and international economies. That was a period rather like the situation in the early 1980s when I first came to Berkeley. That was a period when jobs were rare and it was a recessionary time in the mining industries, throughout the western world certainly. So there were very few students doing mining. I was one of a class of seven. And a year ahead of me was a class of four. After that it went up quite rapidly.

Swent: So you had a lot of individual attention.

McPherson: Yes, and that helped in the sense that there was plenty of help available at university. But it made me worried about the future. I'd always wanted to be in mining; this is what I'd driven for against everyone's advice at home. Had I done the right thing? And I went through a period, it didn't last very long, during that first year at university when I was having a tough time academically, wondering, "Should I be doing something else?" It didn't last very long.

I think my brother was a help in this as well. I remember having a conversation with him when he was a manager of a very large mine by that time, "Now, Jim, maybe I should be an electrical engineer, maybe I should be a civil engineer or mechanical or something. Is there a future in mining?"

And he said, "Well, let me tell you something. Each morning when I get to my office, I need to get reports from my specialists so I press a button and the unit electrical engineer comes in and gives me his report, and I press another button and the unit civil engineer comes in and gives me his report and we chat about that, and I press another button and the unit mechanical engineer comes in and gives me a report. Now," he said, "Malcolm, what do you want to be? One of those guys who come running, or the man who presses the button?"

That was it, you know. I was committed to mining. And it's something I've never regretted since.

Swent: You didn't want to be his secretary and you didn't want to be his civil engineer.

McPherson: So I graduated in 1962 with a B.Sc. A B.Sc. is equivalent to the B.S. in the United States. And in England, in the U.K., first degrees, bachelor's degrees, are classified, they're graded into various classifications. And I was fortunate enough to get a first-class honors degree. I was the only one in the class to get it. I remember my mother and father coming up to university for graduation. I think one's first graduation is always the one you remember best.

Swent: They must have been thrilled.

McPherson: Yes, I remember my father walking down the corridor in Nottingham where they'd posted up the examination results, everyone's name and the order of the classification of degrees with my name at the top. It was the only one with first-class honors. And he just stood there. I had to drag him away. I think he was more impressed with that little bit of paper than he was by the graduation ceremony.

Swent: That's wonderful.

McPherson: What happened after that? Oh yes, my intention when I first went to university was to get a degree. At that time, in those early days, any kind of degree in mining would have done me.

Any classification would have sufficed. All I wanted to do was go back to the mines, pick up my practical work where I'd left off, after I was qualified, work my way through the management hierarchy, and maybe become colliery manager one day.

But something else happened to me through those years. I'd always been brought up and lived in mining communities, living usually within sight of the mine yards. The house we had at Ellistown was literally right across the road from the mine. I'd been brought up like that, living, breathing mining all of my life, and I suddenly found myself at a large university in the center of a city with mines around it, yes, but lots and lots of other things going on at the same time. I was making friends with physicists, chemists, and philosophers, economists, budding politicians, and lawyers, and I began to realize, "Hey, there's a big world out there beyond mines. Mining is very important but do I really want to go back and live in mining villages all my life?"

And the consequence of this rethinking was a move away from an ambition to be involved in mine production, to be in charge of operations, through to a growing interest in research, teaching, as well as doing a job as an engineer. The academic and the practical have always gone side by side with me, all through my life.

I was financed by a National Coal Board scholarship, and the normal progression of events was to go as a graduate into their professional mining engineering training scheme. It was called the DPT scheme (Directed Practical Training) and that was a two- or three-year professional training period, after graduation. During this, they put you through the various administrative departments, as well as mining operations. And I went along for the DPT interview to Sherwood Lodge; it's in a little village near Nottingham. Sherwood Lodge was the divisional headquarters covering the whole of central England and that's where they had all these DPT interviews.

The man who was chairman of that committee was called P.L. Collinson, whom I got to know fairly well long, long afterwards. He was a senior official of the National Coal Board and he happened to be in charge of the DPT interviewing sessions that year. So, he had my file, he knew all my history and so on, and he personally knew my father and brother. He and the panel obviously expected me to go back to the National Coal Board and progress through the DPT scheme and then, in their eyes, the sky's the limit. And that was the sort of expectation of me during the opening shots of the interview.

But before I let him get too far I interrupted and said, "Mr. Collinson, I want to go back to the Board and work in the coal industry but I would like to get a Ph.D. first," which meant another three years at university.

His face dropped and he said, "Well, you know we don't really have openings for Ph.D. people. There are one or two slots at our research establishments, but they need mainly other kinds of engineers, specialists and scientists, rather than straight mining engineers."

I said, "Well, I don't want to have any kind of special treatment after I come back to the Board but I want to get my Ph.D. first and then go to the Board. I'll still work my way through the management hierarchy." This started an argument and it just got worse and worse.

Eventually, I remember old Collinson, long dead now, lost patience with me and he said, "Well, McPherson, if you spend another three years at university we shall no longer be interested in you."

I said, "Thank you Mr. Collinson." And that was it. I walked out. So I went back to the department and spoke to old Baden Hinsley, whom I knew very well by that time, and he was pleased that I had decided to stay on for research.

Swent: Had he encouraged you?

McPherson: He had, indeed, yes. And I wanted to work with him. So that started me on my research career. It is interesting to reflect that if they had accepted my argument at the DPT interview then I would have gone back to the NCB after my Ph.D. and my career would have been entirely different.

6. GRADUATE RESEARCH AND THE FIRST VENTILATION NETWORK PROGRAMS, 1962-1965

Swent: Did you have a scholarship then for your graduate work as well?

McPherson: Yes, I'd had an undergraduate scholarship from the National Coal Board, but when we went our different ways after that interview I was no longer considered eligible. They would no longer give me any money, but old Hinsley got me a state scholarship, a government scholarship, which lasted for two years. During that period my Ph.D. research was concerned with thermodynamic investigation of airflows through very large industrial fans, in particular mine fans, which are the largest kind of fans used. I was particularly interested in fans that were passing a mixture of air and water, which is the situation up at Lead, for example. In deep hot mines, you can see the fog coming out of the fan evasees. The fans are actually passing a mixture of water vapor, air and liquid droplets. The thermodynamics of the phase changes that take place are quite complex and it's very difficult in fact to do an efficiency test with a large fan that's working in that condition. That was the general line I was working on.

Swent: How did you happen to do this? Was this something that presented itself to you, or that you dreamed up?

McPherson: No, this was Baden Hinsley's suggestion. What I wanted to do, and this is, again, a reflection of my background, what I wanted to do was research in fires, explosions, all that kind of rescue work that fascinated me. And we chatted a long time about that. The real problem was there was no funding available for that kind of work at that time, but we did have some funding for these thermodynamic analyses.

Swent: Where did that come from?

McPherson: That was state money. There was and still is a system of grants given through the UGC (University Grants Committee). But it's taxpayer's money, it's state money, it's given to universities for particular projects and to support particular students. I was lucky enough to get one of those.

Swent: This is often the case, isn't it? The research is directed by where the money can be gotten?

McPherson: That's right. But there was another influence there; one of the comments I remember Hinsley making to me, knowing my fascination with rescue work and the hazards of underground mining. One day he said to me, "You know, the best way of preventing the tragedies arising from fires and explosions is not to have them in the first place. And that means designing good ventilation and mine environmental systems." So this broadened me out from my restricted view of rescue work.

Swent: A little better than canaries.

McPherson: Right. And I had three years as a Ph.D. candidate. I got my Ph.D. in 1965 on that subject, thermodynamics of large main fans, but there's something more significant that happened during that period. As part of my research I had to produce a long detailed list of tables; there is a copy on my bookshelf there. My Ph.D. thesis is in two volumes and one of them is just a set of tables. A very detailed set of thermodynamic tables. And this was the time, 1961, 1962, 1963, when electronic digital computers were becoming a practical tool.

Swent: Had you used them before at all?

McPherson: I'd never seen one before that time. During my undergraduate days we used to do our survey calculations using seven-figure logs to begin with, log books, and eventually we moved on to electromechanical calculating machines. But I'd never seen an electronic digital computer before. And there were very few large (for those days) electronic computers. Our nearest one was in Manchester, which was about one hundred miles north of us, but a link, a telephone link, had been established between Nottingham University and Manchester University where this Atlas computer was.

Swent: Those were the things that were as big as a room and had to be refrigerated?

McPherson: Yes, that's right, enormous things. So this seemed to me to be a way of producing those hundreds of pages of tables that I had to develop. So I went up to Manchester for a two-day course on programming. The language was Atlas Autocode, and it was a strange new world for me. But I came back armed with enough knowledge to write some simple programs. Some of the newly developing computer experts at Nottingham were a lot of help to me. A guy called Dr. Pitteway--an unusual name, Pitteway--was head of the new computing department. It seems strange now, a computing department without a computer. But he helped me to write some more sophisticated programs. So I was on my way writing programs and I produced my tables. There were very few people who could write computer programs in those days.

One of the things that had always been a problem to any designer of mine ventilation systems was in predicting just what the airflows were going to be in individual branches, individual tunnels, and individual faces. A mine is made up of hundreds of interconnecting branches forming the ventilation system, so predicting what those airflows are going to be, branch by branch, for any given location and duties of fans had always been a problem. In fact, there was no real practical way of doing it until the early 1950s when analog computers, models of mines, started to be built but having electrical current flowing through wires and resistors to simulate air currents through the branches of mines. So these analog computers had been around for some time. They were also developed in Nottingham, the first one, in the early '50s.

Swent: Were you in touch with the people that were doing that?

McPherson: They were developed by a man called Scott, David Scott, who also worked under Hinsley for his Ph.D., but ten years before my time.

Swent: But he was still there when you came?

McPherson: No, he had moved down to London. I met him several times. That's another story I'll get to later on. He offered me a job at one time. But anyway, these analog computers had been fairly well developed and they were being used pretty well around the world. Similar ones had been developed here in the United States by the Bureau of Mines. But they were kind of clumsy to use and it took a considerable amount of time to simulate a large mine. I read up a lot of the work that Scott and Hinsley had done earlier on the numerical analysis of mine ventilation networks. Those had been an academic exercise at that time because the computation was far too lengthy to be practical even with electromechanical calculators.

But with my experience of writing these programs for my Ph.D. work, I thought, "I'm going to have a crack at writing a network analysis program." And it worked. I used a very simple example. It was a real mine but a simple network, and I managed to develop a program to a stage where it was giving accurate results and that were tying up with measurements that were made in the mine. It was a very crude program but for the first time we had a rapid means of quantifying airflow distributions in full mine systems.

Actually, I must backtrack. The very first network I analyzed on the computer was an example given in an earlier paper by Hinsley and Scott. It had taken David Scott many days to calculate it out on an electromechanical machine. I recall taking my computer printout into Hinsley's office and showing him the much more accurate results I had obtained. It had taken the computer only two seconds. He just stared at it and said, "Good Lord."

Swent: So you could predict where the air would go or how much? What were the factors you were getting, how fast it went and temperature?

McPherson: The airflow, the amount of cubic feet of air flowing per minute through each of the airways. It was just airflow. At that stage it was not temperature or mine climate. Those came later. In that early phase it was just the quantity rather than the quality of the air. But the significant thing was, even though it was a crude program by present day standards, we could now produce in a few seconds results that maybe took three or four days on the analog computer.

Swent: And hadn't even been done before computers I guess, really, at all.

McPherson: Not in any practical way. So I was doing this in parallel with my Ph.D. work. Fascinating work. I got my Ph.D. in '65, but from '64 onwards my work on computerization of mine ventilation networks became much more significant in terms of its usefulness.

We ran into an interesting confrontation with the British Aircraft Corporation at the time. BAC had brought out a much faster form of analog computer for fluid network distribution systems. They actually developed it for water distribution networks, domestic water and so on. But it could be adapted for any other kind of fluid including airflow. Now this was an automated version of the older analog that would produce results much, much quicker. So, the National Coal Board were about to buy and commission three of these very expensive automated analogs at the time when I brought out my first paper on using a digital computer to do the same thing. Hinsley and I went to a couple of the divisional headquarters to talk, to see the mine ventilation engineers about what we were doing and where we thought it was going and, to cut a long story short, we finished up with a meeting being arranged at the Water Research Establishment down near London where the British Aircraft Corporation were going to demonstrate their WANDA computer (Water Network Distribution Analyzer).

All the divisional ventilation engineers with the Coal Board attended. Some of the people in the Coal Board asked me to analyze a mine ventilation system using a digital computer. They also asked one of the area ventilation engineers, Tony Pickering, to do it on the older analog, the same mine, and they asked the British Aircraft Corporation to set this same mine up on their automated analog for the demonstration. So we were down there for a day. By that time I had tried all kinds of exercises on the basic mine network and with differing fan characteristics. It was so simple and fast to do on the digital computer.

So I had scores of different scenarios down there with me. After the BAC people had run through their well rehearsed demonstration I started asking "What if" questions. "What if you change positions from A to B and what happens if you take this airway out or put this one in?" I had all the answers in front of me and could check their answers immediately. They were trying to do this and getting more and more confused. In retrospect, it was a little unfair, but I sensed that the methodology of ventilation planning for the whole British mining industry during the following decade was at stake.

The upshot of it was that all the NCB divisional people who were there came away from that meeting saying, "We're going digital." I then spent a year, '64-'65, when I was writing up my Ph.D. work, but most of my time was involved in traveling around the coal fields up and down the country, Scotland, England, all over the place, all these places we looked at on the map, and doing demonstrations of the new digital method. It just caught on like wild fire.

Swent: Just the right thing at the right time.

McPherson: Yes, it really spread very, very rapidly, so the Coal Board never did buy the automatic analogs. And this was the thing that really got my name known as an individual.

Swent: You were the only one who was doing it?

McPherson: At that time, in 1964, yes. What I didn't know was that there was another fellow called Y.J. Wang working at Penn State across here. He published a paper a year after I published my first one. We had, in fact, been working in parallel along identical lines.

Swent: And didn't know.

McPherson: Right. We didn't know of each other's existence then. He was a graduate student, I was a graduate student, you know. I happened to come up first with the paper so I got the credit in the U.K., but Y.J. got the credit in the U.S. which is as it should have been.

Swent: Do you know each other now?

McPherson: Very well, we're good friends now. So that was an exciting time for me.

7. START OF AN ACADEMIC CAREER AND TIES WITH INDUSTRY, 1965-1968

McPherson: It was on the basis of that work, as I said, David Scott, the original analog guy, offered me a job. David Scott was not a mining engineer, he was a mathematician by background, and he had moved down to London and was head of the National Fan College it was called. I think it still is. He was then concerned mainly with air conditioning and building ventilation, not mining systems at all. He invited me down for interview and asked me to join him down there. The salary he offered me was £1800 per year, which was a lot of money in those days.

Hinsley wanted me to stay on at Nottingham, to join the faculty and be an assistant lecturer, the lowest rung on the academic ladder. But the highest salary he could offer me, the top of the assistant lecturer's scale, was £1250, which was quite a lot lower than Scott's offer. But I knew Hinsley well enough and he promised me that if I stayed at Nottingham I would get really rapid promotion. So I gave up the bigger salary and stayed on in Nottingham. Hinsley was true to his word. I progressed rapidly through the ranks.

Swent: You had no regrets, I take it?

McPherson: No, none at all. So that started me on lecturing. Actually my lecturing career started during the year previously when I was moving up and down the coal fields. I was giving talks and demos all over the place which was valuable experience for me. It was also on a subject with which I was absolutely fascinated so it was fun. So this was how I became a professional university lecturer. And that starts a whole new phase of my career, when I started developing consultancy work and put together a team of experts.

[Interview 2: October 31, 1991]##

Swent: The question that I had was how your research and these developments were communicated? You had mentioned a man named Wang was doing something similar in America but he was a graduate student also, and there wasn't any communication there. But you were getting widely known around England and then subsequently in Africa, South Africa; was it through publications or conferences or were you actively out publicizing what you were doing? How did this sort of thing get communicated?

McPherson: Well, you have my earliest publications there, '63, '64, I think, initially on the work I was doing for my Ph.D. on thermodynamic testing of fans. It went on from there.

Swent: And one of them I see was in the South African Journal.

McPherson: At that time there was only one professional society in the world that specialized entirely in mine ventilation and that was the one in South Africa. Now there is a similar one within the Society of Mining Engineers in the United States. However, at that time, as now, that was the only journal, international journal, that was purely devoted to mine ventilation, so material goes in there from all over the world, not just from South Africa.

Swent: Then there was the University of Nottingham magazine. Would that have wide circulation?

McPherson: Fairly, yes, but mainly within the U.K. But I think the thing that got my presence more firmly established in the United Kingdom was that period in '64, '65 when I was trotting around the country almost all year, talking to people about this new method of network analysis.

Swent: Now how did that come about?

McPherson: I got to know virtually all of the divisional and area ventilation engineers in the National Coal Board. I visited most of the coal fields, and got to know people that way.

Swent: Did they invite you or did you call them and suggest you come to see them?

McPherson: Yes, both ways. If you remember, we talked about that meeting down in London when we had the confrontation between BAC's automated analog and the new methods that we were developing on digital computation. The divisional ventilation engineers were there and I think several invitations arose from that.

Swent: Those were Coal Board people?

McPherson: Yes, right. I got all sorts of invitations. Engineering personnel at universities like to see their research going into practical application, so it was great both for me and for Hinsley, that the work we'd been doing on this was not simply being looked at with paternal interest, but was being eagerly sought after. So that got me around the country. I was only twenty-seven years old at the time and I recall oscillating between nervousness, confidence, and satisfaction as more and more areas started using our method for their ventilation planning. Actually, my comment now contrasts with the feeling that I remember having at the time--at twenty-seven, I felt

Malcolm McPherson's Ph.D. graduation. Nottingham University, 1965.

that it was overdue for me to do something significant. I was very impatient with myself.

Swent: Did most of the mines have ventilation engineers or an engineer who was specifically assigned to ventilation?

McPherson: Right, they did, and that is a big difference between European countries including the U.K., and the United States. At all mines of any size at all, there is a permanent staff of ventilation people, perhaps these days with a graduate level ventilation engineer in charge. And then there are levels of area ventilation engineers above that within British Coal.

Swent: What would be the equivalent sort of person here at that time? Would it be a safety engineer?

McPherson: These are different from safety engineers. They also did and do have safety engineers who are concerned with roof control, machine safety and so on, the general safety. But the ventilation engineer was and is a specialist in his own right.

Swent: Who was concerned, or was anyone concerned with ventilation in American mines?

McPherson: It is done primarily in American mines by general mine engineers. There are some companies, the big ones, the more progressive coal and metal mining companies, who do have full time staff. Jim Walters, Consol[idated Coal], Homestake--up at Lead in South Dakota, John Marks is an excellent ventilation engineer. And he's got a staff there.

Swent: It's relatively new, isn't it?

McPherson: I don't know how long Homestake has had full-time ventilation engineers. John has been there for several years.

Swent: As they go deeper, does ventilation become more important?

McPherson: Well, as the mines become deeper, the environmental problems get worse, and that's usually heat problems for the deeper mines, gas problems for many coal mines, dust problems in virtually all mines, and radon problems are getting more and more recognized. As these things get more serious, then it becomes important to have good people looking after them. The tendency in the United States is that apart from these exceptional companies that do have full-time permanent staff,the other mines have the routine day-to-day control of ventilation looked after by one of the general mine engineers, and the more specialized design and forward planning work goes out to consultants. And I've done a lot of that, my group, in the United States. Unfortunately, still too many mines neglect their ventilation planning. This can have very expensive and, sometimes, tragic consequences.

Swent: Was there any resentment on the part of--well, sometimes when the fellow from the university comes into the mine and starts telling the engineers how things should be done, there's a little bit of awkwardness, shall we say. Did you run into that? The practical people versus the academic types?

McPherson: I've seen that occur very often, you're right. I've never badly been affected by that kind of attitude and I think this is one of the things that working in the mines to begin with has helped me a lot on. Being able to go into mines in different countries. A funny thing about mining, we were talking yesterday about how close miners can be to each other, how they help each other, they have the same sense of humor as well, I've found, around the world. The language might be different but they laugh and cry at the same things.

So being able to go into a mine, even as a university back room boy, and stop to have a little chat with each of the miners, talking to them in a way that they can relate to, makes a lot of difference. And it really depends on your attitude. Another thing that helps is to ask more questions than give opinions. This is sometimes difficult to do for a university professor. But if they see that you want to listen to what they have to say, then they quickly open up and you establish good relationships.

Swent: Was there skepticism about the computer work?

McPherson: Oh, a lot. Yes. Not only in the industry, but even in the universities in those days. I told you how I started using computers for my Ph.D. work and then it went into network analysis which became much more important at that time, and since. That system revolutionized ventilation planning around the world, all of that work. And it's now virtually the only method that's used anywhere for long term ventilation planning.

Swent: This is directly yours that--

McPherson: The work that was done at that time. There was myself working in the U.K. on this, and modern versions of my programs are used, pretty well around the world now. And as I say, Y.J. Wang was working independently at the same time in the U.S.

without our knowing of each other. His programs became the predominant programs in the United States.

Swent: Are they similar to yours?

McPherson: Very similar number crunching routines. They both use the same type of numerical analysis. In fact, it's quite remarkable how similar the internal cores were that we were working on, though separately. Anyway, you were asking about people being a little skeptical about computers, and it was not only the industry. When I started lecturing formally at Nottingham as a faculty member, Baden Hinsley was still head of the department. He asked me to take over the ventilation lectures from him. This included a sequence of laboratory exercises. We had a beautiful ventilation lab at Nottingham. I also wanted to put together a little lecture program on computer programming. That wasn't done anywhere in the university.

Swent: This was '63?

McPherson: Sixty-four, sixty-five. And there were only a very few places in the country that were teaching computer programming. Hinsley knew how useful this had been to me in my Ph.D. work and it certainly seemed of value with all this network analysis material, but teaching it to undergraduates? That was something else. I remember him saying, "Well, Malcolm, maybe we should wait a couple of years to see if this new-fangled thing catches on." (I couldn't resist reminding him of that later on.)

But I was so keen on it that I actually took some of my laboratory time and unofficially used it to teach some programming to undergraduates, and they got so enthusiastic. It was terrific. We were suddenly the first in Nottingham to do it, and we were quite proud of that. We got into some scrapes over it. We were still using what was then this super-duper computer up in Manchester, with a line link.

One of the little anecdotes I can tell you was about one of my students who was particularly keen. He became very well known later on with computer work.

Swent: What's his name?

McPherson: Bachelor, Tony Bachelor. He went beyond the Atlas Autocode programming language that we were using, and he started to get familiar with the machine code for that computer, which is really the way the computer sees instructions at a very basic level. And in that computer then, as has proliferated since, there were permanent functions for logarithms, the sines, tangents, and all of those things. You could just program the word in and the machine would do the function computation for you.

Somehow or other Tony got into that internal part of the computer memory. He swore he doesn't know how it happened but he got into the internal part of the memory. He didn't alter the algorithms but somehow or other he switched the names around, so when someone asked for a logarithm they got a tangent, when they asked for a tangent they got a sine. People had links from all over the country to this same computer. And for twenty-four hours everything went crazy, you know. We tracked it down to something Tony had done. We had some fun and games in those days. So, I think we were certainly the first group in Nottingham, and I think one of the first in the U.K., to teach programming to undergraduates.

Another example of nervousness about computers arose during a meeting of the Junior Council of the Institution of Mining Engineers held down in Grosvenor Place, London. Each year, the Junior Council undertook a special study for publication. I recall arguing vehemently to do a study on the future of digital computers in the mining industry. I could see the potential, but I found myself in a minority of one. Instead, they chose the "Role of the Face Chargeman." I always recall that as a lost opportunity for those young engineers to look to the future.

Swent: Did Hinsley object to your out-shining him?

McPherson: Oh, I don't think I ever did. You know, people move on and you progress on the work that has gone before. In any case, I never recall any jealousies amongst the mining faculty at Nottingham. We worked together as a team, rejoicing at each other's successes and commiserating with each other at times of disappointment. We all strived to help each other. We were mining men.

Swent: He didn't mind?

McPherson: No, no, not at all. He was my teacher, he was my advisor, and then he became a great, great friend. Hinsley was nearing retirement at that time. He was a great mentor and derived tremendous pleasure from the work of his students. For many years after, he was my career guidance counselor. We all loved and respected him. We stayed close friends until he died just two or three years ago. He was a great fellow.

I was conscious yesterday of just rambling on, talking, talking, talking, so I'm glad to see that you're asking questions and guiding me today.

Swent: Well, I'll let you get started with more talking now. I see that you did teach computer science from '67 to '71.

McPherson: That's when it became official, yes, and became a much bigger program.

Swent: And computer utilization in the minerals industries from '70 to '81. Were you interacting with physics and other engineering departments at that time as well, or just in mining?

McPherson: With other engineering departments, certainly we were, particularly in the teaching within the three-year degree program in engineering at Nottingham. The first year was essentially a common year for all of the engineers, much like it is here at Berkeley. But each of the major engineering departments had one or more courses that they taught to all of the first year engineers. We, in mining, were responsible for teaching all the first-year fluid mechanics and later on in thermodynamics as well. So that kept us in daily working contact with other engineering departments.

Then in the second and third years we did all of the teaching internally within the department for our own mining students. We're probably going to come onto this later, but one of the big differences I found coming to work at an American university was that at the British universities the courses are much more integrated and inter-related, whereas at American university the students typically take courses in different departments all over the place, often from professors who don't know each other. They get a much broader type of education.

Swent: Here?

McPherson: Yes.

Swent: But that was a three-year versus a four-year course?

McPherson: That was a three-year course, yes, that's right. Although, remember I did four years because I was such a dummy when I went in, I had to do a remedial year.

Swent: Okay, so you started in as a what, a lecturer?

McPherson: Assistant lecturer was the title. One of the other things that was to have a lasting effect on my career started when I was a graduate student. This was my involvement with the Institution of Mining Engineers, which is one of the professional institutions governing mining in the United Kingdom. There are, in fact, two. There's the Institution of Mining Engineers and the Institution of Mining and Metallurgy. My involvement with IME, the Institution of Mining Engineers, really started to develop during my graduate research days.

The IME started as local societies in various parts of the country, oh, from about 1850 onwards, so it's a fairly old professional institution. There were junior sections, junior branches, in various places throughout the country and throughout the coal fields. But at about that time, the first half of the sixties, they decided that they wanted to have a Junior National Council to run in parallel with the organization of the senior body. I was invited to take part in setting this up.

So I was one of the founder members of the Junior Section of the Institution of Mining Engineers. That started me going down to London for meetings, averaging once a month. It also got me into contact with other young engineers and other young academics, again from all over the Kingdom, Scotland, England and Wales. That was another way of getting to know people and interacting. That was to have a lasting effect. Some of the people on that founding Junior Council are in various senior positions now.

Swent: Is there any equivalent in this country?

McPherson: Well, yes, certainly. The Society of Mining Engineers has student chapters. We have a student chapter of SME right here at Berkeley. They were just in today showing me their annual report and they're very proud of it. A nice job. So, yes, sure. But they don't have the equivalent of the National Council at a junior level. At the annual meetings of SME, they have a section on careers and for young people, but there is no sort of governing level at national level for young people in SME.

Swent: Were there job or industrial relationships then with the university as well? Were there companies involved? Of course nationalization would have affected that, wouldn't it?

McPherson: Right. It was primarily a relationship between the National Coal Board, as it was then called, and the university. And that was very close. We were in the heart of a major coal field. We had very good relations with most of the managers and senior officials in the coal fields around us. Many of them were graduates of either our university or other mining schools in the U.K. So there was a pretty close relationship. We had many visits from top level officials of the NCB.

Swent: Was there funding? Did you have to scurry around for funding for your research projects and that sort of thing?

McPherson: We had very good funding from the Coal Board. And we also had other sources as well. From government, like my own Ph.D. research fellowship as a graduate student. And there were, and are, other companies in the United Kingdom. British Gypsum for example has quite a number of mines up and down the country; relatively small compared with the giant National Coal Board. But there were and are private companies, and we had involvements with those as well. So, yes, the research all of us were involved in, really from the mid-sixties onwards, was quite applied. Solving problems in the mines. Our best laboratories were the underground mines but we had a beautiful main lab at the university, a magnificent lab.

Swent: What kind of lab?

McPherson: Magnificent, beautiful. My ventilation lab was approximately 300 feet long by about 100 feet across and about 100 feet high. We had enormous wind tunnels in there, full-sized mine-type wind tunnels. Hinsley had built all of that up. And much of the funding for the equipment in there came from the National Coal Board. Some of the equipment came directly from the National Coal Board. So they were very good, and throughout my time at Nottingham we had a close relationship. It worked very well.

Another thing that we did (and they still do) is every Easter the students who were taking surveying--and they had to take mine surveying, compulsory for at least two years--every Easter they went to North Wales to survey camp near a place called Llangollen. I went to these as a student but I went to one or two of them afterwards as a staff member.

It was great fun to take the students out there for two weeks, surveying in the Welsh hills, running traverse lines over the mountains, chasing the sheep away and trying to get your lines through. My team was once chased by an irate bull. We made the fence just in time, minus the equipment. You get to know each other really well when you're living together like that. Those were great, great times.

Okay, where were we? Oh yes, the research that was going on at that time. Hinsley retired in 1967, and he was replaced by a new head of the department, Hubert King, who had previously been at Leeds University as head of the department there. Nottingham was a larger department and we had this very close relationship with the industry, so I guess it was a more attractive looking place for him. So he came down from Leeds to replace Hinsley. Hinsley was an international expert on mine ventilation and the department certainly reflected that. He was there twenty years or so. Hubert King was more of a rock mechanics person.

However, the emphasis on environmental work, ventilation and other forms of mine environmental work, did not reduce, but I found myself leading the whole thing up then. That became quite an exciting time for me. I also flirted for a little while with the heating, ventilating, and air conditioning industry for buildings. The fellow who offered me the job down in London was David Scott. We'd kept in contact, and a number of people that had graduated from the mining department with Master's or Ph.D.'s in ventilation had moved over into HVAC work. Quite a few of them had moved from mine ventilation across to that kind of work because this was a period, remember, my class was a very small one, this was one of those down cycles of the mining industry throughout the world, throughout the western world.

So I flirted with that for a little while in the mid-sixties, and did some research with a guy called Alan Sherratt. He had gained his Ph.D. in our department before my time under Hinsley, and he had moved sideways into surface building ventilation. He actually came back to Nottingham, after some time in industry, not into the mining department, but into architecture I think it was. He inveigled me into looking at this for a while. We did a little bit of work together but, quite honestly, I found it boring compared with mining. First of all, it seemed so straightforward. A lot of the design work involved putting together various components, various kinds of ducts and fittings. You used all the design factors and you got what you expected most of the time, okay. The thing that was missing was the challenge, the unexpected that you get in mining, what's going to be round the corner, what's going to happen tomorrow? I missed all that. So I didn't spend long with other forms of ventilation.

8. FIRST TRIP TO THE UNITED STATES, 1968

McPherson: Nineteen sixty-eight was another turning point for me because that was the first time I went overseas professionally, and it was to the United States. My very first trip overseas was to the U.S.

Swent: How did that come about?

McPherson: It came about because of my involvement in all of this computerized design work. An organization had started in the U.S. that was concerned with computer applications in mining. It's an organization that's still going on now. It started at the Colorado School of Mines near Denver, and they had initiated a series of annual meetings, so I went along to the one in 1968.

Swent: It was my feeling that computers were first used just for computing ore reserves in mines.

McPherson: The first use of computers, digital computers, in mining, and I think generally in commerce, was for payroll, administrative kind of work. The first application of computers in a technical sense, you're probably right in the United States, it probably was for ore reserve estimation.

Swent: Just computations to save time.

McPherson: Yes, that may well have been the case in the U.S.

Swent: Ventilation maybe came later.

McPherson: In the United Kingdom, where coal mining is by far the biggest mining activity, there's relatively little metal mining, ore reserve estimation is much less important. I mean, it's easier to delineate a deposit of a coal seam than it is with a disseminated metal ore deposit. So that was not such a driving force in the U.K., but ventilation network analysis, I know, was the first major technical application of digital computers in mining in the United Kingdom. Anyway, I came across in 1968.

Swent: To Golden?

McPherson: To Golden, Colorado, yes, and stayed in Denver. And I remember it so well, it was in April 1968. My first time a long way from home, a long way over the Atlantic Ocean. I think we landed in New York or Washington and I caught a flight that touched down in St. Louis, and then on to Denver. On the flight to St. Louis, the captain came on the intercom and announced that

Martin Luther King had been assassinated just a few minutes earlier. That was the night I arrived in the United States, so I remember it well.

Swent: Had you heard of him, did you know of him?

McPherson: Oh, yes, very much so. And then other reports came across before we landed about riots that had started in various places and I thought, "Oh no, I'm coming to the U.S. to be shot."

Swent: This was--

McPherson: April 1968.

Swent: I had been going to ask if, because '68 was a turbulent year on college campuses in this country, was there any turbulence in Nottingham?

McPherson: Not to that extent. We had the occasional sit-ins and had a little bit of fun and games, but nothing to the extent that had occurred in the '60s at Berkeley, no.

Swent: Okay, so back to Golden.

McPherson: Yes, the fellow who was in charge of that was a grand old guy. His name was Professor Frush, Charlie Frush, and he was quite well known at that time.

Swent: Was this one of those Mine Ventilation Congresses?

McPherson: No, this was one of those conferences on the application of computers in mining, an APCOM conference. And this was at Golden. So I got to know some of the people in mining in the United States.

Swent: Did you meet Mr. Wang?

McPherson: No, I didn't, not at that time. He had published his first paper in '65 or '66, so we certainly knew of each other's existence at that time, but we didn't know each other. I learned a lot about what was happening in the United States with respect to computer development, hardware development. That was interesting for me. I also took the opportunity of flying on from Denver to California. I have a sister-in-law who lived in Los Angeles at the time and so I flew down there.

My excuse for doing this was because Howard Hartman, Professor Hartman who was, again, an international figure in mine ventilation, was working in California at that time. He had written a book that had come out shortly beforehand, '62, that I'd found useful. At that time he was Dean of Engineering at Sacramento State. So I went down to Los Angeles and stayed with Audrey, my sister-in-law, for a few days, and then flew up to see Howard and had a good chat with him. He's now an old friend. That was the first time I met him, over twenty years ago.

So that was my first trip abroad and it was the start of globe trotting for a quite a number of years after that. But that's how it all started.

Swent: Did anything directly change as a result of attending this conference?

McPherson: Not in a direct sense, but it certainly opened my eyes, again, just like I went to university and found there was a world outside of mining. I was now realizing that even within the mining world, it was a much bigger world than I had thought. I guess it gave me a realization of the importance of traveling and seeing how people did things in different ways in other countries, why the differences and why the similarities, a respect for the other guy's opinion, and an urge to learn from other people. It made the world a little bit smaller as it were.

Swent: What other countries were represented there?

McPherson: It was international, I can't remember.

Swent: More than just England and Canada?

McPherson: Oh, yes, right.

9. DEVELOPMENTS AT NOTTINGHAM AND TRAVELS IN EASTERN EUROPE, 1968-1971

McPherson: Okay, what other things of those days might be of interest? Oh, one of the things that we started in the late sixties was something that became very successful, and that concerned our recruitment efforts to have students come into mining. We had gone through this period of very low recruitment of which I was part as a student and we were certainly coming out of that.

But in order to encourage it further we had started what was called the Focus on Mining course. This was a one-week course for students from high schools to come along to the university. They came for five or six days, and we ran these courses every year for many years, I think right up until after the time I left in '81. We ran them in conjunction with the National Coal Board. The participants spent most of their time at the university doing some simplified forms of laboratory work, simplified compared with what the undergraduates would be doing. They also spent some time underground, speaking with practicing engineers. These courses were tremendously successful.

Swent: I should think so.

McPherson: We had many students coming into the department after that from these courses. They worked well. We'd tried various things before that, one-day courses, going to schools and all the things we've done at Berkeley as well, but those five-day concentrated courses, they were so successful.

Swent: Were they during school term?

McPherson: We used to have them towards the end of the academic year to try and get the people in after they'd finished their examinations at school. And they became very popular. We had hundreds of applications to come to these things once they got started.

Swent: How did the teachers feel about them?

McPherson: They were very positive about it. These were courses for the students, not for the teachers, but we did have teachers come along at different times.

Swent: I meant the university teachers that had to--

McPherson: Oh, they were so enthusiastic.

Swent: Oh, they were, they didn't mind?

McPherson: Oh, yes, they were there throughout the days and also for evening activities and mine visits. This was also a period, as I say, when I was beginning to take up the leadership of the mine environmental work. We had twelve or thirteen faculty, and about half of them were involved in environmental work in some way. This was the influence of Hinsley. And we began to put together a team.

Swent: This is your university-based consultancy team?

McPherson: Yes, this is how it all started. It was very informal, we were never a company, registered in the formal sense. It was just a group of people who had common interests. Let me get some of these names down. There was Les Morris, who was a real expert on methane; there was Ian Longson, great on fluid mechanics and a thermodynamicist--all of these were mining engineers but with specialisms; there was Jim Brown, who was great on noise pollution; there was Julian Edwards, who was an expert on spontaneous combustion and blasting, vibration, he also did a lot of work on methane.

Those were the initial group, I think, with myself, and we started getting work in from everywhere. We had all worked with and for the National Coal Board and we did unpaid consultancy work for them in addition to our research with the Coal Board. If any of the managers or area people gave us a call and said, "Can you take a look at this?" we did. This was unpaid so there was a closeness there. But then we started getting work in from other places and it really built up to an international thing; we had people going all over the world.

After my initial visit to the United States, I spent quite a lot of time on visits to Eastern Europe. My first visit to Poland was in June of 1969, and I met a man there who became a very old friend, he still is. Waclaw Trutwin, who was then, like me, fairly junior in the academic world, but Professor Trutwin, as he now is, has been the head of the very well-known Rock Mechanics Institute of the Academy of Sciences in Krakow for some years. So he's quite an important fellow in the Polish mining fraternity now. There were lots of other places, Bulgaria, Hungary.

Swent: Did you visit mines or universities or both?

McPherson: Yes, combinations of giving lectures, conferences, visiting mines, looking at problems. A lot of those visits were made with another old friend of mine, Alan Grierson, who was at the Royal School of Mines at Imperial College in London. We spent a lot of time zipping around the countries of Eastern Europe through those years. That was quite an education.

Swent: Were they inviting you to come because they had problems they thought you could solve?

McPherson: Yes, but mainly for lectures, conferences. I was also invited to become the British representative on an organization across there called ICAMC, and that was concerned with automation in mines and collieries. What was the meaning of the acronym? I think it was the International Conference on the Automation of

Mines and Collieries. Anyway, it was an organization that was concerned with increasing mechanization, automation in coal mines particularly, but other forms of mines as well. And this, obviously, relied in quite a large way on the increasing use of computers, on-line computers, which, again, I was quite involved in.

Swent: This wasn't just ventilation then? This was mechanization.

McPherson: This was not just ventilation, this was all forms of computer usage in mining. In fact, one of the other good friends I made out there was a mine electrical engineer, Professor Ludgar Szklarski. He was also one of the senior hierarchy in the Academy of Sciences in Poland. As I say, he was an electrical engineer, so there was a lot of crossfertilization between the various mining disciplines.

Swent: Did most of these people speak English?

McPherson: Some of them did, not all. We had some fun and games. Trutwin and Szklarski were both very fluent in English. I had done French at school a long while before, which I'd never used.

One of the jokes that we often heard at that time--remember how the Cold War was in those days? Rather tense. We used to have some fun with the Polish people particularly, who were so scathing about the Russian masters. And one of the "in" jokes among our Russian friends was when I asked, "What language is really useful out here, that's going to be most useful throughout Europe?"

And the answer used to come back, "Well, if you're optimistic, Russian; if you're pessimistic, Chinese." So, eventually, I took classes and learned enough German to get me around. Because that was the most commonly used language.

Swent: In Eastern Europe?

McPherson: In Eastern Europe, apart from their own languages.

Swent: Were their computers as advanced as what you were using?

McPherson: No, really, a lot of the work I was doing in Eastern Europe was fairly analytical, basic, rather than numerical simulation, which I had concentrated in at Nottingham.

Swent: But it was still with computers? They did have computers?

McPherson: Oh, yes, and they were not as advanced as the western countries, that's true. But very enthusiastic. They have some great engineers across there. I had a lot of good times, got arrested once at a mine in Poland for taking unauthorized photographs. That was fun. It didn't last too long. They got me out of it.

There were certain things across there that you just had to get used to. Go into a hotel in one of the Eastern European countries and they'd take your passport. You wouldn't see it again until you left. That kind of worried me the first time it happened, you know, being in a very different type of society in a foreign country without a passport, it can be kind of hairy. But, that's just how it was, you know, they took your passport, registered your presence with the local police and they kept your passport to make sure you weren't going to disappear before you got on a plane again to leave the country.

Swent: Were they forthcoming with data and information?

McPherson: In the technical sense, yes. Completely free. I was never conscious of any problems at all in that area.

Swent: And you were allowed to visit in mines?

McPherson: With guides, yes. As I say, they were a little bit touchy about taking photographs.

Swent: Would these just be coal mines?

McPherson: Yes, these were all coal mines.

Swent: Because I understand that the uranium mines were something else again.

McPherson: Yes, I didn't visit any mines other than coal mines, that's true.

Swent: But even those were of strategic importance.

McPherson: Oh yes, but I never was conscious of any problems of technical exchange at all. There were some things that one learned not to ask too many questions about. They didn't like to talk about production rates, how much they were producing. They didn't like to talk about labor relations or wages or that kind of thing.

Swent: Did you have any sense that they were using slave labor?

McPherson: No, not at all, quite the contrary. One of the mines I visited in Poland was called Lenin Colliery. I'll never forget that name. It was magnificent. The facilities on the surface were the best I'd seen anywhere in the world at a coal mine. They had an enormous indoor heated swimming pool for the workers, the bathing arrangements were superb. They had no reason to hide themselves at all from that point of view. That was, as I say, a very, very good one. I saw others which were not so good. But no, there was no sense of any kind of slave labor relationship at all. There may have been in other places but I never found that in Poland, Bulgaria, or Hungary or Czechoslovakia. They seemed quite happy.

I did find out through a kind of circuitous route afterwards, that the British, my own people, were keeping track of where I was going and who I was talking to. So you can imagine that the communists were doing the same thing. But I never had any problems moving around as long as it was concerned with mining. Anyway, you're leading me off on tangents again, which is fine.

Swent: The university didn't object to your doing this junketing?

McPherson: No, a lot of it was done during vacation periods. In the British system we had longer, quite apart from the long summer break, we had longer breaks also at Christmas and Easter than what is normal here. Also, at this time, we were putting together this team of people at Nottingham, and, as I say, very informally, it was not really planned. It was just that we were being successful in doing all kinds of things and it began to make sense to operate together as a team. And it was a fun and very exciting time for all of us I think. Dashing about the world. Whilst at the same time continuing with our formal research for the National Coal Board.

10. RESEARCH ON GAS OUTBURSTS AND AUTOMATIC CONTROL OF VENTILATION

McPherson: Is it of interest to talk about some of the research we were doing in those times?

Swent: Yes, by all means. I have the list of classes you taught and the things you published, but what was your research?

McPherson: Let me just chat about one or two of them, some of the exciting ones. I think the first major research project that I had led up as what we would call a principal investigator now, was concerned with gas outbursts in coal mines.

We talked a little bit yesterday about gases and the dangers of gases in mines. Methane is, by far, the most predominant natural gas, and this is emitted into coal mines in many different ways. Some of it comes out fairly slowly in a very controlled manner. It's a dangerous gas because it becomes explosive when mixed with air. Sometimes the gas is in such high concentration and high pressure within pockets in the coal seams that when you mine towards one of these pockets, it bursts out with explosive force, and you can get many thousands of cubic meters of this highly explosive gas just flooding into the workings.

Swent: Even though it's not ignited, it's just the pressure?

McPherson: Right, there are two main dangers associated with this. The first one is that before a gas outburst occurs, the gas is held within pockets of highly pulverized coal, compressed coal dust if you like. So when it explodes outwards it's coming with some hundreds of tons of finely divided coal dust as well. So anyone that's on the coal face or in that heading is going to be engulfed in the mixture of nearly pure methane and coal dust. There's no oxygen, so they get suffocated.

The other thing that can happen is that during the explosion outwards, during the expansion of the gas which is occurring with explosive force, this gives a shock wave that disturbs equipment, knocks it over, breaks cables, so you may get sparks occurring at the same time you've got an explosive concentration of methane, so you may get real explosions. Many miners have died in the United Kingdom and other places as well because of these outbursts. This was a growing problem at that time, during the late sixties and early seventies.

We were asked by the National Coal Board to head up a major research project, a fundamental research project into this whole phenomenon of gas outbursts and how they might be mitigated. That was the first major investigation that I led up. It went on for a number of years and we produced lots of papers on it. Some of them are on my list there. Eventually we got to know a lot about the various mechanisms of how these gas outbursts happen, and we came up with methods of combating the problem.

Swent: How do you do research on this?

McPherson: A combination of basic science, sound engineering logic, and a lot, a lot of field work. Lots of experimental work in the field.

Swent: You actually go out into the places where they've happened?

McPherson: And where they are likely to happen. Some mines are much more liable to outbursts than others so we'd go out there, we'd put lots of bore holes in, we'd take pressure measurements. Actually, it's strange, later on I became interested in petroleum engineering, and North Sea oil began to appear. This was some years later and I actually taught petroleum engineering for a while.

I didn't realize it at the time, but when we were doing this outburst work, we were developing methods of bore hole testing, pressure tests, various kinds of flow tests and measurements of permeability of the rock in-situ. We were actually developing methods that were at the same time being developed by the petroleum industry. And that was quite interesting.

But to cut a long story short, we did eventually devise various kinds of tests that would allow the mines to know when they were getting into an outburst zone. We could then do something about it, put additional bore holes in to relieve the pressure, get all of the men out of the mine and shot fire the area to induce the outburst when there was nobody there. Quite a number of methods we came up with. And it was great. As far as I'm aware, from the early seventies to now, no one has died from an outburst in the U.K. So that was a good project.

Swent: Yes, indeed. I do want, whenever it comes up, to be sure that if you had any failures, let's mention those. Everybody likes to chronicle successes.

McPherson: Lots of failures, I guess.

Swent: Well, I don't know, but just, sometimes we learn a lot from failures.

McPherson: Yes, well, there was another project that was not nearly so successful that we had going in those early days. It was a more of a future looking idea. This is something I pushed, and maybe this was a failure on my part. It concerned automation of mine ventilation--to devise a system where the ventilation of a mine would change automatically according to the conditions. So if you got high resistance, then regulators would open and let more air through, or if you had an increased methane concentration, this would be sensed by monitors and the fans would speed up or, again, regulators would move and combat this problem.

This was a grandiose idea I had to automate a full ventilation system. We spent a lot of money on this and had a few graduate students, and we got it working beautifully in the laboratory. We had very sophisticated models into which we injected methane. We had little regulators which would open and close, and we studied the stability of the system. Similar work was actually going on in Sweden and the United States at the same time so I wasn't alone in this.

But when we wanted to transfer this into an actual mine, we came up with a lot of opposition from practicing mining engineers. And, in retrospect, they were right and I was wrong. The problem was two things. First of all, we didn't at that time have accurate enough monitors to really measure with a sufficient degree of accuracy the velocity, the pressures, and certainly not the gas concentrations that we could have in the lab. Fine in the lab with sophisticated equipment, but not stuff you could take into rigors of a mine. That was one thing.

And the second thing was if you get into an emergency, if you have one of these gas outbursts for example, which was beyond the range of capability of an automatic system, what did you do about it? You would still have to revert to manual control, and if some automatic control system had been trying to handle it, then it could create an even more dangerous situation. The problem was that we were ahead of our time on this. I mean, this kind of thing is now happening in some mines around the world. But there we were twenty years ago, the ideas were too far ahead of what was available in hardware to make it work. So that was an interesting project, but I guess you could call that a failure.

Swent: Maybe not, if it was just ahead of its time.

McPherson: Yes.

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Swent: So your first research was on gas outbursts.

McPherson: First major project, yes. I had lots of other things.

Swent: Major, yes, that was very successful.

11. THE DOMESTIC SCENE, 1964-1971

McPherson: We've been talking about all these professional things. Is it okay to talk about the more domestic scenes?

Swent: Yes, once in awhile I think we should bring in that, yes. What's Shirley doing while you're gadding about the world?

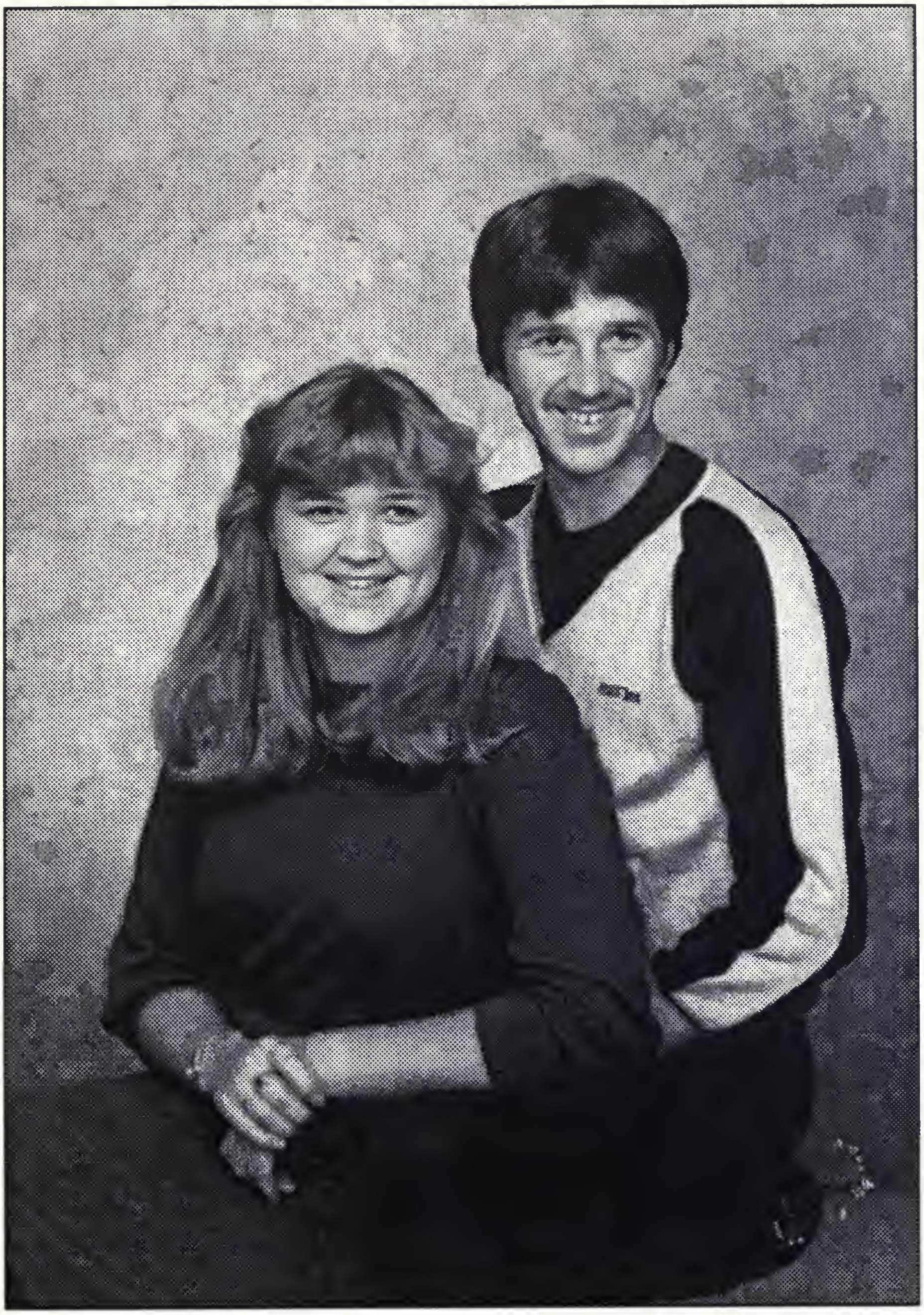
McPherson: Other things certainly had been happening during this period. My son was born in 1964, Malcolm, Jr., that is, and my daughter Alison was born in '67, about the time that Hinsley retired. In fact, we had this magnificent retirement dinner for Baden Hinsley. That was quite a night because he had generated such loyalty from his students and he had produced, in particular, ventilation engineers who were then working all over the world. Canada, Australia, South Africa. A lot of these came back from other countries just to be there for his retirement dinner, which was amazing.

Swent: Where was it?

McPherson: At the University, in one of the halls of residence at Nottingham. It was a Saturday night, April 29, 1967. And it was just a few days before that that Alison, my daughter, was born. That was another story. I'd received a call from Shirley that she thought the baby was on the way. That was about six o'clock in the evening, and I scooted down into my car. We had a new Vice Chancellor, Dr. Dainton. The head of the university is the Vice Chancellor at British universities; the Chancellor is always an honorary figure, a Lord or Peer or something like that.

I got this call from Shirley; she thought the baby was on the way, so I ran down, got into my car and was hurrying through the campus, breaking all the speed limits, and this figure just shot out from the grass verge. It was the new Vice Chancellor who had a real thing about speeding on campus. So I rolled down my window, obviously in a hurry. I recognized him but he didn't know who I was. He said, "Do you realize there's a speed limit on this campus, young man?"

And I said, "Yes, thank you sir, but I have a baby on the way. Good night." And I just put my foot down, and I remember looking in the mirror and he was standing there in the middle of the road with his mouth wide open.



Alison McPherson and Malcolm McPherson, Jr., 1984.

We had our first house in a little village called Chilwell, which is not far from Nottingham, but shortly after Alison was born we moved from Chilwell to a rural village called Ruddington, which was on the south side of the Trent River. It was a new house, and Ruddington was, and is, a beautiful little village. We had many happy years there and really became a part of the social life at that village with the local people, and there were a lot of people who worked in the city of course. But those were great days.

Swent: What sorts of things did you do?

McPherson: Well, we moved into one of the very few parts of the village that had been allowed to be developed, for houses to be built. But all our neighbors were like us, young professional people with young families so we made many friends, babysitting for each other, babysitting groups, and a lot of activity with the local church. We used to have village dances once a month and we were involved in organizing those.

Shirley, particularly, was heavily involved. Shirley, at that time, had started working in a nursery group with pre-school children. She became very interested in it and she went to college and became qualified in this. She subsequently became head of quite a large nursery group, the biggest one in Ruddington. So that got her very involved with all the mums and dads, and, you know, we made lots and lots of friends. So it was a real fun time from that point of view. All of this was an exciting time actually, both professionally and socially.

Swent: You form very close friendships in a case like that.

McPherson: Oh, right, and those friendships are still there now. We visit, we've had lots of people come across from England these last ten years while we've been here.

Swent: What was the church?

McPherson: The church that we were involved with was an Anglican Church, St. Peter's in the Church of England.

Swent: Not Presbyterian?

McPherson: No, I was brought up Presbyterian in Scotland in my very early days, and there was actually a Church of Scotland in Nottingham that one of my colleagues, Jim Brown I mentioned, was part of. But we got really wrapped up in the village atmosphere and it was great, it was fun, we had a lot of good times there.

12. START OF THE SOUTH AFRICAN CONNECTION

McPherson: So, what happened next, the next water-shed? I think the next real significant change or turning point for me was in 1970. When one looks back on a career, Lee, you can see in hindsight that there were certain key figures that made a big difference or that caused you to take a new turn. We talked about my family background, my father and my brother were certainly such figures within the family.

John Morris at Coalville was the real cause of my going to university. Otherwise, I'd probably be a colliery manager today somewhere in England. And then Hinsley was responsible for me staying in mining, one, and two, staying in the academic side of mining.

Another figure appeared in 1970, and this was a man called Austin Whillier, who for many years was another world leader in the whole field of mine environmental work. He was from the Chamber of Mines of South Africa, and he was across in the U.K. for a visit. He had read of some of my papers and was interested in establishing computerized network analysis for the deep gold mines of South Africa. They had done none of that work down there. But they had tremendous experience on heat problems, which to that time had not been a problem in European coal mines at all. It became so later on but at that time it wasn't a problem.

Swent: This comes with depth?

McPherson: Yes, right, that's one of the reasons. So the South Africans were the real world leaders in dealing with heat problems in deep mine environments. But they were looking to us to get them started on the computer design of ventilation systems.

Swent: Their own universities had not gotten them?

McPherson: They were doing a lot of simulation work but it was all concerned with the mine climate, rather than airflow. The pioneer on that work was Dr. Tony Starfield, who is now also in the States. They were concerned with the condition, the climatic condition of the air, but they'd not done any work at all on the actual quantity flow of the air itself. Hinsley, who had retired, still had an office at the University. He was an emeritus professor.

Whillier had actually come to see Hinsley and talk about some of these problems, and Hinsley very rapidly brought me in to the conversations. I had a couple of days with Austin Whillier and I found him an absolutely fascinating man to talk with. He was certainly the most well-rounded engineer that I have ever met. Do you know Ian Finney, in mechanical engineering here at Berkeley?

Swent: No, I'm sorry, I don't.

McPherson: He's a senior member of the mechanical engineering department here. Austin Whillier and he were fellow students at MIT together. And then Austin went to Canada. He was a South African but he went to Canada. He got married up there to Mary and finished up back in South Africa after spending some time in Barbados. A terrific engineer with a tremendous reputation. Another guy who could go into a mine and talk to the people freely. Most of the time during his visit, we had been talking about my work on ventilation network analysis and computer applications.

When he was getting ready to leave on that last afternoon, he happened to mention some work he'd been doing on measuring the efficiencies of pumps, very large pumps that they use for dewatering in deep mines and how he could determine the efficiency of these pumps simply by taking the temperature of the water going in and the temperature of the water going out. I had read some of his work so I was familiar with it.

He remarked, "We would like to apply this to fans as well." Because they have these enormous fans for their very deep mines with massive, massive airflows, but the air that's passing through them is fogged. It's water as well as air. And he said, "There's no way we can measure the efficiency of these fans that are so very expensive to operate, so we can't check the manufacturer's specifications."

I said, "Hey, Dr. Whillier, I did my Ph.D. on that." And he was there for another three hours after we had shaken hands to say goodbye, talking about this. We realized this was another area in which we could get together and since 1965, for those five years, I'd hardly looked at my own thesis. You know, it was in the past.

13. WORKING AT THE CHAMBER OF MINES IN SOUTH AFRICA, 1971-1975

McPherson: Well, to cut a long story short, I found myself in South Africa the following year working at the Chamber of Mines in Johannesburg. I was there for three months, and during that time I established some of the systems that I'd developed in Nottingham on the big computers at the University of Witwatersrand in Johannesburg, and that went fairly quickly. It was work already done, it was a matter of getting it punched into the computer, no problem.

Another guy that I got to know very well afterwards was John Burrows who was the head of the training department of the Chamber of Mines, training all the ventilation engineers.

Swent: Was Neville Cook [Professor and Vice Chairman, Department of Materials Science and Mineral Engineering, University of California, Berkeley] there then?

McPherson; Neville Cook was in a different laboratory. He was also part of the Chamber of Mines. I took part in a training course for advanced ventilation engineers. A similar kind of course that I'd given in the U.K. The reactions of the South African engineers were great. For the very first time they could actually predict airflows and measure them and "Hey, you know, it works."

But Austin very quickly had me moving on from simply predicting airflows to also involving the condition of the air, the temperature and the humidity of the air. So I found myself becoming involved in work that they had become so expert in, heat simulation. We began to put the two systems together, and before I'd left there the end of that summer, we had produced an enormous program called TEMPSIM. It was really clumsy, but it produced airflows in a detailed way, and temperatures and humidities and so on. We made a lot of progress and there was real cooperation between two countries. It was terrific. And the other thing that--

Swent: This was in 1970?

McPherson: This was '71. Austin came across in '70 and I made the visit in '71. I was also invited to give a paper to the senior section of the Mine Ventilation Society of South Africa in Johannesburg on the work that I'd done on testing of fogged fans. Most of their main fans were running in that condition. And before I actually left that summer we carried out a major test on one of these big fans. I think that it was at Harmony Gold Mine down in the Welkom area of South Africa.

Anyway, we carried out this thermometric test on a big fan that was passing fogged air. You'd think of South Africa as a warm country, but I spent all night on top of that fan drift and it was absolutely freezing. We couldn't do it during the day because of the radiation effect of the sun on the temperature transducers. But it worked nicely. Again, it came out in practice.

Swent: When you say, "It worked beautifully," what do you mean?

McPherson: Well, we were able to establish with a high degree of precision the actual operating characteristics of the fan, the efficiency of it and an accurate determination of the volume flows and the power it was taking. All those things that add up to many dollars at the end of the year.

Swent: I was going to say, what good does it do you to know this? Satisfaction, but what else?

McPherson: Okay, the pure economic return is that these fans, and indeed, in any large mine, the main fans are the largest user of electrical power because they're going twenty-four hours a day, constantly. They may not have quite as large motors as major hoists, but they are going continuously, so they are the major user of electrical power. So they are costly to operate. So a one percent difference in efficiency can mean a lot of money at the end of the year. We were interested in finding out just what these efficiencies were.

Swent: Can you improve the efficiency once you know these things?

McPherson: By adjusting the angles of the blades on the fan. There is an optimum setting for any given resistance of the mine. If you're a little bit off on that then you pay a lot of money just for churning the air and causing turbulence. So it's a good idea to keep your eye on efficiency of the fans. Particularly these very large ones.

Swent: When you say large: how large were they?

McPherson: Oh, in the range of a million cubic feet per minute, very large things, twenty foot diameter or more, something like that.

Swent: So once you had these measurements you could then adjust and make other measurements and have them at optimum efficiency.

McPherson: Yes, right. And the other thing was, when they purchased a new fan they were given specifications by the manufacturer that the fan would perform at a certain rate and a certain efficiency.

They can back these up by tests at the manufacturer's plant. Put the fan actually in practice, then there was no practical way of testing it in-situ. Because as soon as you tried to measure airflow in, think of a heavy, heavy thunder storm, then instruments just get physically destroyed. But just by measuring temperatures we could do it in this new way. They gave me a gold medal for that.

Swent: Yes, I noticed you had the gold medal of the Mine Ventilation Society of South Africa.

McPherson: That was nice of them.

Swent: Yes, indeed. What do you do with this gold medal?

McPherson: Oh, these things are somewhere in a drawer at home. I've got several such awards. Shirley looks after them.

Swent: Better put them in the safe deposit box after our experience of this fire. [Oakland Hills fire, October 1991.]

McPherson: Right. The family went down to South Africa with me during that time.

Swent: Oh, they did? You were there quite a while then.

McPherson: Yes, I was there three months, and for most of that time Shirley and the two kids were with us. We rented two houses. The first one was in an area called Sandringham, which is in the suburbs of Johannesburg. It was the first time for us in South Africa. It's a different way of life from anywhere else. We were there for about a month renting a house from a family who were overseas. They came back and we rented another house in similar circumstances. But it was a good time. Again, you get to know people.

We had some trips, of course, with the family. We went to Kruger Park, the largest national park in South Africa. We stayed at a camp called Shingwidzi, which is the most northerly camp in Kruger, and is also the most primitive. That's the reason I wanted to go there. But we had to feed ourselves, you know, cook over the camp fire. The camp itself had a big wide fence around it. We slept in a rondavel, you know, African type beehive hut. Driving around outside during the day was fascinating, seeing all of the animals. Lots of elephants, impala of all kinds. We saw one or two lions, but every night we were there, we were there three or four nights, we could hear lions roaring on the outside of the fence. They were looking for food I guess.

Swent: Let's see, your son was seven? That must have been a wonderful age for him to do that.

McPherson: Yes, he had his birthday during one of these safari trips. That was actually down in Natal. And that was funny because we stayed at this nice, they called it a hotel, but I guess the United States would call it more of a camp. Little rondavels again. But there was a nice restaurant there. I remember we went into the restaurant the night we arrived, and it happened to be Malcolm's birthday. They had candles on all the tables which was their usual thing, but Malcolm thought it was because of his birthday. We had a lot of fun there as a family.

Anyway, coming back from that started a new phase in my career. I was then in professional contact and working with the South Africans, even from England. I went back again for another three months in '73, '74. It must have been '73, I guess, where we took this whole idea of combining climatic and ventilation simulation programs to quite an advanced degree. We got a number of the big gold mines using our system, we trained a lot of people.

Another thing that emerged at that time was this sense of international cooperation. The South Africans then, as now, felt isolated from the rest of the world because of their political situation. I remember there was a crowd of us sitting in the Chamber of Mines clubhouse one day, and we were sort of swinging ideas around about how to improve international cooperation.

I think it was John Burrows who said, "Why don't we have an international congress?" There had never been an international congress in mine ventilation. And we all thought that was a very good idea so we started from that casual conversation. A committee was put together that organized a congress which actually occurred in 1975 in Johannesburg.

Swent: That was the first one?

McPherson: That was the first of them. And that started an organization which went on from strength to strength. We now have an international congress every four years, and that's gone on ever since. We've had congresses in Johannesburg, here in the States, the third in the United Kingdom, the fourth was in Brisbane, and the next one is back in Johannesburg, next year, 1992. Those congresses have had a big influence in the international world of mine ventilation in bringing people together, getting people to know each other and be able to talk to each other, even from different countries. I've seen the influence of that congress through techniques being transferred from one country to another, and things being tried out and real advances being made because of that.

Swent: This is because of the papers presented or the conversations?

McPherson: The papers, but more particularly, getting people together.

Swent: The conversations after the papers?

McPherson: It's one thing seeing a paper written by someone in Canada or Australia that you've never heard of, and it looks interesting, so maybe you write and ask some questions and get it back and that's it. But if you sit across the table with a guy or you have dinner with him and you have a couple of beers together, then there's a much closer relationship, and you really communicate more freely after that. It gets things going and promotes those little trusts. That works.

Swent: And this all came about because of John Burrows.

McPherson: Yes. Actually, the initial chairman of the congress was another fellow that I had got to know very well, Barcza, Misci Barcza. He was a Hungarian. He was getting on a little bit at that time. He didn't work for the Chamber of Mines, he worked for an independent research organization called the Corner House Laboratories, but he had been a Chamber of Mines fellow for many years. He was actually quite ill at the time when we made him chairman of the organizing committee. Unfortunately, he died in '74, and John Burrows took over the chairmanship of the organizing committee, and he was the chairman of the first congress. That was something else that I was glad to be associated with from the beginning.

Swent: So the first one was 1975. And you were there, of course.

McPherson: Yes. Right, very much so. Another thing I was able to organize with being very familiar with both the Chamber of Mines and Europe. I was able to get some people from European countries that would otherwise have had difficulty getting into South Africa. I was able to smooth the way for quite a few people. It was nice to be able to do that. The other thing was, Hinsley had retired eight years before. He was then not in very good health, but I persuaded him to come to Johannesburg for that first congress. And I got finance for his trip from the Chamber of Mines of South Africa. They paid his whole way. They were very, very generous. So I got old Hinsley out to Johannesburg. It was his very last trip overseas and he was very frail, but he was chairman at the first of the sessions. He got a standing ovation because everybody knew his name. So that was nice to get him across there for what was to be his last professional appearance.

Swent: The Chamber of Mines doesn't have any real counterpart in the United States, does it?

McPherson: No, it doesn't. This is something that I've often advocated, particularly with the metal producers, or more particularly the gold producers. I have talked to Harry Conger [chairman and chief executive officer, Homestake Mining Company] about this. The Chamber of Mines of South Africa is a very large organization. The research limb of the Chamber of Mines is only one of its branches. It is a private organization financed by the mining companies. It's not government run, but they have such tremendous power that they do all the central negotiation on wages, do all the recruitment of people, centrally, and they've got an enormous influence on the whole of the gold trade in the world.

If we had something like that, maybe on a smaller scale, just looking at research in the U.S., it would save a great deal of money and do a lot of useful things. But the argument against that premise is, yes, but in such a strongly capitalist society as the U.S., we're very jealous of proprietary rights and if we spend a dollar today on research then we want that dollar's worth of research to be ours and not our competitors. So this is the difficulty. But you're right, I wish we did have something like that here.

Swent: We've got the Bureau of Mines and the Mining Congress, all sorts of organizations that do part of that.

14. WORK IN NOVA SCOTIA AND UNIVERSITY DUTIES, EARLY 1970s

McPherson: The other thing that happened during this period throughout the '70s was that our work with the group in Nottingham, particularly throughout Europe, continued to increase, and that was a decade of pretty frantic dashing around for me. Quite apart from the South African work I was doing. I think I was trotting all over Europe within the shorter periods in between the long summers when I was in South Africa. Just looking at some of my diaries, in '71 I got home from Johannesburg on

September 17, the family had come back a week or two earlier, I had to shoot off to Budapest on the 25th, one week later.

Two days after I'd got back from Hungary I got a phone call from Cape Breton in Nova Scotia. They have big coal mines that go out underneath the sea there. They'd run into difficulties with controlling the ventilation, gassy mines as well, could I come out immediately. I'd been all summer in South Africa, got back from there, into Europe, got back from there and off to Canada.

I don't know how Shirley put up with it. She was wonderful. That's another story. That trip to Nova Scotia was interesting. Do you want to hear about that?

Swent: Yes, please.

McPherson: When I got that call it was mid-week. They wanted me over to advise them on this mine on Cape Breton Island in the northern part of Nova Scotia. The general manager of that whole group was a guy called Black, or was it Blackmore? It seems a long time ago. Anyway, he was an ex-British patriot. In fact, a lot of the people across there were ex-Brits.

So, thinking of my badly neglected family, I said, "No, I can't come immediately."

"Okay, can you come at the week end?" I found myself on a plane going to Halifax, Canada. Halifax and up to Sidney in Cape Breton. I arrived there very late Saturday night, somebody met me at the airport. It was one of the senior engineers from the head office of the Cape Breton Development Corporation, DEVCO it was called. So I got to the motel in Sidney, very late, got to bed, up early the next morning to meet the same engineer.

He was going to pick me up in the hotel. I met him in the restaurant and he said, "Have you seen the newspapers this morning?"

I said, "No, I just arrived last night, and I just got up."

He'd brought me the newspaper and the headlines were "Was he Pushed or Did He Jump?" This was in reference to the general manager of the company who'd telephoned me three days earlier. He had resigned that night previously, the night I arrived. Part of it was the difficulty of organizing these mines and problems with the men in the union, none of which I knew about.

So I said, "Fine, well, now what do we do?"

And he said, "Well, we've still got the same problem." So I spent all that Sunday in one of the design offices at DEVCO headquarters going over the mine plans. We arranged to go underground on Monday and Tuesday.

The situation was this. They had gone so far out underneath the sea that even using booster fans, which they were doing, the ventilation was out of control. They just could not produce the airflow to handle the methane gas on the faces. And the only way they could see to handle it was to drive a new drift from surface, maybe three or four miles sloping underneath the ocean to get more air down there.

And the question was, was this going to be worth it? Would it give them the benefit so that they could go on for another two or three miles under the sea? If they could do this, then fine. If it wasn't going to give them that amount of airflow, then it wasn't an economic proposition. And this was really the question that was being put to me. Should they drive this new drift?

I spent all that Sunday until the evening going over the maps. I got back to the hotel, had dinner by myself, went back to my room, and got a telephone call. Somebody wanted to meet me in the bar. I went along to the bar of the restaurant; they gave me a name but it didn't mean anything to me. I went along there and it was a deputation from the local miners' union who had learned all about me being there as a consultant.

Their argument was that they did not want to lose jobs for their members, and no matter what the cost was, we had to keep this mine working. They were really putting pressure on me to take these matters into consideration in my report. I'd no idea what my report was going to say at that stage; I'd just started. But to them, this mine had to be kept working.

And that was at the end of the day when I had heard this story from the mining engineers about the cost of driving this long, long drift. So I spent the rest of the week there running ventilation surveys, got lots of measurements, and developed a schematic of the network.

I went back to Nottingham and got it on my computer system. They had no computers in Cape Breton at that time. I put in on our computer system at Nottingham. I ran lots of analyses, and came up with a different suggestion that, in fact, they put down another shaft vertically on the shore line of the sea, and in effect develop a new mine at the side of the old one. This would open up far more reserves for them and would get them coupled up with the ventilation system at the old mine. They could move further out as well as sideways. And forget about the slope. And, in fact, this is what they did in the end.

We had one of their young engineers come across to Nottingham a couple of years later and take a Master's degree with us on the same sort of work. But that was quite an experience. I've had this a number of times since, finding oneself involved as a consultant not simply in the technology of what you're supposed to be there for, but all kinds of other issues involving labor and politics and social conditions and so on. It's one of the fascinating things about being a consultant in mining engineering. That was a nice example of it.

Swent: Nice when it ends so happily.

McPherson: Yes. And we've done other work up there since then. So this was the kind of life I had through the seventies. I had similar things in trips to Australia. I was consultant for Broken Hill. Two companies in Broken Hill in Australia. Also from Mt. Isa mines, the giant mine in northern Queensland. I had a fascinating time in India. Maybe we can talk about it tomorrow because I'm getting dry. But it was really a time when my career took off in the international sense. It was an exciting period.

Swent: It certainly sounds like it. You're thinking about stopping now, are you?

McPherson: I'm getting hoarse. I gave a lecture this morning, before you came in.

[Interview 3: November 1, 1991]##

McPherson: You know, I'm still hoarse from yesterday. We were talking about some of the things that happened during the seventies. One of the other things that was relevant, I think, to my career development at the time was the introduction of mini-computers. A lot of my work in the sixties had been concerned with computerized design systems for mine ventilation. When the mini-computers started to appear in the early seventies, we started transferring more and more of that work to those machines. I remember we had a little Wang mini-computer at Nottingham. Remember those?

Swent: Yes, but they were still not the personal or the lap top. They were as big as a refrigerator?

McPherson: Right, they were still quite clumsy by today's standards. The difference was having a machine there in front of you that you could control rather than a batch processing system where you have to rely on other people and go through time-sharing on a main frame.

Swent: You were going up to Manchester.

McPherson: No.

Swent: You had a telephone link with Manchester first.

McPherson: That was in the very early days. But in the midsixties we had our own main frames at Nottingham.

Swent: But still a big main frame.

McPherson: Oh yes. A new building was constructed as the Computer Center. That's another thing. Being involved quite early with computational methods on electronic computers at Nottingham, I found myself on the main governing board at Nottingham University that controlled all the computer developments. I was involved in getting the funds for putting up a new computer building, and which machines to buy and so on. That was quite interesting.

Swent: Which machines did you buy?

McPherson: They were British. English Electric, KDF9's, oh I forget all the names now. Like all of those machines in those days, they were very much less sophisticated than we have today, a much smaller memory, and bulkier as well, but it was exciting at that time to be involved in that.

Swent: Yes, indeed.

McPherson: The other thing that happened during the seventies was the increase in student numbers in mining engineering. When I was a student myself, as an undergraduate, I already mentioned that I was in a class of seven. The numbers increased during the sixties quite significantly. And by the time--

Swent: Partly by your recruiting program?

McPherson: I think mainly because of the natural cycle of the industry. I think this was happening all over the place at that time. There was an increase in student numbers, people coming into mining. We were running with classes of over thirty in each year by the turn of the decade, 1970.

Swent: Were there any women coming in?

McPherson: Not at that time. No. And of course, when the energy crisis occurred, what was that '73, '74?

Swent: Seventy-three I think.

McPherson: Yes, then everything went crazy all over the western world. And we went through a very exciting period then. We already had as many students at Nottingham as we wanted, even before that. But after that occurred, applications were coming in by the hundreds. That continued for a few years. What we had to do was put rather punitive increases in the entry requirements for people coming in. So the quality of students went up, and for a few years the mining department at Nottingham had the highest entry level of required academic attainment of any department in the college of engineering.

And the same thing happened in the United States at about the same time. The mining schools opened up or reopened. Some of the big schools across in the East had literally hundreds of students. And that had a negative repercussion later on in the '80s, but we'll get to that. So that was quite an exciting time, lots of students and very high quality students, both at undergraduate and graduate level.

15. PERSONALITIES IN SOUTH AFRICA; HEAT PROBLEMS IN MINES

McPherson: Returning to my time in South Africa. Some of the names may be useful to put on record. I got to know and interacted with quite a number of the group ventilation engineers of the large gold mining companies. Roger Hemp was a great help from Rand Mines, Doug Graves and Dick Stroh of Anglo-American, which was the largest corporation and still is. Dick Stroh, a fine engineer, very competent.

Swent: Roger Hemp you said was the--

McPherson: Roger Hemp was with Rand Mines. He's still there. We keep in touch. Rand--Barlow Mines. Then there was Bill Holding of Anglo Vaal; he came from the north of England originally.

Swent: Good man?

McPherson: Yes, very good. He was with Anglo Vaal. And yesterday, of course, I mentioned the people at the Chamber of Mines that I was working with fairly closely. John Burrows and, most of all, Austin Whillier. A lot of the time when I was down there, when I did not have the family with me, I stayed with Austin and Mary and their family. And those were invigorating times.

Austin lived in a Chamber of Mines house right next door to the research labs, so we'd typically go out to our respective offices about eight o'clock in the morning, get back about six at night, have a meal, and Austin and I used to talk sometimes until the early hours of the morning about all kinds of things. Developments in the mines in our own field, but other things as well. We predicted the space shuttle, which was just science fiction in those days. And, you know, traveling from one side of the world to another in an hour in space shuttle types of vehicles, which I still think will come.

Swent: Let's see, Sputnik was what, '57?

McPherson: And this would have been early '70s.

Swent: Fifteen years.

McPherson: Yes, space travel had started. We were looking beyond the times. One of the many things that Austin is most remembered for is a particular method of analyzing cooling towers where water is sprayed into the top of a very large chamber and air passes through the other way, either to cool the air or to cool the water, depending which is the cooler to start with. To that time, there had no really good way of analyzing the performance of cooling towers. Austin developed a simple technique that became very valuable and gave a "Factor of Merit," as he termed it, to quantify the efficiency of a cooling tower.

I remember being there that night when he put two graphs together and found that one was a mirror image of the other. There was a relationship, and--

Swent: Two graphs?

McPherson: Yes, there were two forms of graphs that should have a relationship with each other but no one ever found it before. And we found that by turning one page over, putting it on top of the other, and holding it up to the light, they formed a single curve rather than two curves. And Austin was so excited about that. It was invigorating to work with him. A great, great, guy. A great family as well. Two sons and a daughter.

Swent: Were the politics of South Africa an issue?

McPherson: Oh, we talked a lot about that, yes. In fact, there was quite a divergence of opinion among the circle of people I worked with. Everything from fairly strong supporters of the nationalist government through to those who were on the liberal side, who were equally adamant. I used to get into tremendous arguments, but good natured, down there.

After the last time I was over there, which was in '75, it was made clear that they would like me to stay permanently. This came to a head when, several months after we got back home, I had a letter from Neville Cook (who's now here) making a formal invitation for me to become director of one of the laboratories at the Chamber. We thought long and hard about that. Both my parents and Shirley's parents were still alive and none of them were very well, so we didn't really want to leave them at that stage.

But one of the things that really influenced us was an incident that occurred shortly after we came back in '74 when all the family had been down there. Alison, my daughter, was about seven years old at that time. The kids had said very little to us whilst actually in South Africa about the obvious social differences between the blacks and whites. We'd expected some questions but there were very few.

One day shortly after coming back, Shirley was walking through the local supermarket with Alison, pushing the trolley. I wasn't there; Shirley told me this. There was a black family just a few feet in front, and quite innocently, little Alison said, "Why are those black people in the same shop as we are?" And it stunned Shirley and it stunned me, because the kids had seen blacks and whites mixing very freely in England, but had also had some experience in South Africa. We had to give whatever kind of explanation we could to a seven-year-old, but that, really, was a turning point. We thought, we really don't want our kids to be brought up full time in an atmosphere that generates that kind of question. So that was that. The final reason we decided not to go to South Africa. And in the long term it proved right anyway.

Another thing that was happening was that, through my work in South Africa, I was turning more and more attention to the questions of temperature and humidity in mines--the quality of the air as distinct from the quantity of the airflow that I'd been so much concerned with before. I wrote one or two papers and presented and published them in the U.K. about the work going on in South Africa. But there was another reason for doing this, and that is that heat problems were beginning to appear in British and German coal mines. Not simply because of depth.

The mines were getting deeper, but it was not simply because of that, but also because of the increase in mechanization that was going into those mines. Many thousands of kilowatts, maybe three or four megawatts of electrical power going on to a single longwall face. It's rather like walking down the corridor outside this room with the roof, floor and sides of the corridor covered in red hot electrical heaters. It was that kind of thing, that amount of power going in. So, in order to handle that degree of machine heat, we were beginning to install cooling devices. Very small at first, and then it increased later on.

Swent: Was this for safety reasons?

McPherson: Simply so that people could work.

Swent: For the comfort and safety of the workers.

McPherson: Yes, the climatic environment, right. So there was a growing interest in problems of heat and humidity in the U.K., and the same thing was happening in Germany at the same time. So there was a lot of interest in this, what was new technology to the British mining engineers. So it was a nice combination; it was purely fortuitous that my work in South Africa happened to be at that particular time when heat was a problem that was growing in British mines, so that worked out well.

Swent: You were called into Germany as well?

McPherson: No, I never actually worked in Germany. I worked quite a bit with German mining engineers in other places paradoxically; they were excellent people. They do have some excellent people in Germany, and great mining engineers.

Swent: Traditionally, that was the place you went to study. At least from here we used to. Were you trading ideas with any of the people from Germany?

McPherson: Oh yes, all around the world.

Swent: What about India?

McPherson: We're coming to that in a minute. I started working as a consultant for a new mine in the northeast of England. It was called Boulby Mine. It was a potash mine, which was different. It was the first of its kind in the U.K. The company was called Cleveland Potash. It was initially owned partly by Anglo-American, the South African company, and ICI (Imperial Chemical Industries). It was a fifty-fifty arrangement. They had a lot of trouble putting the shafts down--that's another story--but during the first few years made quite hefty losses and ICI drew out. Anglo-American was then the sole owners. They didn't call themselves Anglo-American. They called themselves Charter Consolidated, which was the British limb of Anglo-American. That was just a political ploy.

But this mine interested me because it was the deepest mine, with the deepest pair of shafts in the country. They went down to 1150 meters. It was in potash, which was new for me. It was very hot because of the depth and the high thermal conductivity of the potash. I received a call to go and take a look at this mine because they were in difficulties, both with ventilation and with the air temperatures. I started working with the people up there. They had a full-time ventilation staff led by George Robinson, another great guy. We started practical work up there with some of my people from Nottingham on August 14 and 15, 1976.

Swent: Excuse me just a moment. "My people from Nottingham"--were these students?

McPherson: Yes, one student, Kevin Gibson, did some valuable work for me on climatic simulations, and also assistance from the rest of the faculty that were involved in our team. I gave you their names yesterday. We did a major survey of the two shafts. It was the first survey of its type that had been carried out in the U.K. for many years. We were looking to a complete thermodynamic analysis of the mine involving pressures, temperatures, humidities, the whole thing. And that worked out pretty well.

George Robinson and I wrote two papers on the environmental planning at Boulby and got another gold medal for it. So I found myself spending a lot of time in the northeast of England at Cleveland Potash. I used to stay in a beautiful old hotel called the Grinkle Park Hotel. It was fascinating because it was out on the moors there, northeast of England, in all the heather, and it had been an old abbey. Of course it was haunted like all these old abbeys are, so it was fun staying up there.

I paid another visit to the United States in 1976, this time to Penn State--another of these APCOM conferences I mentioned yesterday. By that time, of course, I knew some of the people in the U.S. a little bit better so I had a good time across there. I had several visits from Austin Whillier back in England. I found my personal lecture courses increasing in scope. I had been teaching the mine ventilation courses at Nottingham since the sixties, and now I found myself teaching broader courses, thermodynamics, fluid mechanics.

The importance of the surface environment was becoming much clearer then. Land pollution, air pollution, water pollution on surface. We developed courses in those topics as well. The North Sea oil fields were coming on full line production so we started courses on petroleum reservoir engineering and, because of my background in fluid mechanics, methane drainage, and gas and water flow through strata, I found myself giving the primary course on petroleum reservoir engineering. I continued it for quite a few years as well. It was interesting.

16. WORK IN AUSTRALIA, 1977

McPherson: After the 1975 International Congress in Johannesburg, again we found ourselves getting lots of invitations to do consultancy work in various countries. This is when the Australian connection started. The owning company of Mt. Isa Mines in called MIM Holdings. A director of MIM whom I talked to at the '75 congress, Malcolm Rose, contacted me with respect to Mt. Isa Mines themselves.

Swent: Were these underground mines?

McPherson: Very extensive underground mines. It is actually one enormous mine with various kinds of stoping operations in different areas. At that time they were considering moving into a much deeper deposit from the current workings, and they were already in difficulty with keeping the air sufficiently cool where they were. So he asked me if I would go down there and help them develop a ten-year plan for the future design of the ventilation and air conditioning system.

I found myself arriving in Sydney, Australia, on May 6, 1977, which was a Friday evening. I was due to first of all go down to Broken Hill in New South Wales. I was going to spend a week or so down there before flying back up to Queensland. So, I arrived on the Friday and I was supposed to fly down to Broken Hill on the Saturday.

I got up Saturday morning and put the radio on. All the air traffic controllers had gone on strike, and there was no air traffic at all moving around the country. And I had a fairly tight schedule. Things were going crazy. It was the end of some kind of holiday period so people were trying to get children back to school and things were chaotic. So, in true Scottish fashion, I decided, "Well, there's not too much I can do about it so I might as well enjoy myself for the day."

So I explored Sydney and went out for a cruise on the bay. But I did find my way to the main central railway station in Sydney. The trains were full all over the place, but I figured out from the maps that if I got a train going south, going down towards Melbourne, then I could change at some sheep ranch somewhere out in the middle of nowhere and catch the main transcontinental train which went west across the country and that went through Broken Hill. So I figured out, if I could made these connections, then I could get down there. It would take about twenty-four hours.

I couldn't get on one of the sleepers because everything was booked up. So I found myself traveling through the night on that Saturday night crushed against a draughty window. It was very cold. It did take about twenty-four hours, but I got a message through to the people at Broken Hill what I was trying to do, and when I turned up at the little station in Broken Hill, there was somebody there to meet me. So it worked out pretty well.

Swent: Too bad you were traveling at night because that's nice country.

McPherson: Yes, of course once you start going inland it's just flat and barren all the way, but going down the coast is nice. But inland, I mean, Australia is an enormous continent with a very small population, and the population is concentrated around the coast and into a few cities. Inside it's just thousands of miles of nothing.

I did some consultancy work for two companies in Broken Hill. These were both lead-zinc mines, it was all lead zinc area. North Broken Hill--I worked with the group ventilation engineer, Harry Smedman, whom I'd known for quite some time. He had joined us on the International Committee for the ventilation Congresses. He had a Scottish wife. We were able to talk about some of the old days in Scotland, I remember that. That was North Broken Hill.

And I also did some work for the Zinc Corporation. There were several companies. We talk about Broken Hill as if it's one company. It's not. Broken Hill is a town, a big mining town with several companies working the lead-zinc deposits.

Swent: But there is Broken Hill Proprietary.

McPherson: Broken Hill Proprietary of which I believe North Broken Hill is now a part. It's an Australian-based company that is now a big international company. Yes, they bought out Utah International.

Swent: But this other one was Zinc Corporation.

McPherson: The Zinc Corporation, yes. I guess I was about a week there, and it was new for me --a different kind of stoping operation from those that I'd seen before, certainly very different from South Africa. So it was a learning experience for me as well as, hopefully, being some use to them.

The big problem was, at the end of that week, my schedule said that I had to fly up to Brisbane, capital of Queensland, spend two days there, give a seminar at the university in Brisbane, and then fly out for my main assignment at Mt. Isa. And things were still absolutely clamped down. There was still no air traffic. If I was to take trains or go overland, it was going to take so much time that my schedule would just disappear.

So, Harry Smedman and North Broken Hill Company said, "We'll get a private plane and fly you from Broken Hill up to Brisbane, which is a long, long way."

So, here is another funny story. We arranged to be at the little airport at Broken Hill at six o'clock this dark morning. The night before there had been a thunder storm, which is kind of unusual in that part of the country, it's so arid and so dry, but there had been this tremendous thunder storm so everything was wet. Harry and I arrived at this little airstrip with one large hangar. Everything was in darkness, no sign of anybody, completely closed down. So we walked around the hangar and couldn't see anybody, what did we do now?

"Oh," Harry said, "well, it's one of the local pilots who does this in an amateur way, he said he'd be here."

We got back to our car, looked up the hill and saw two headlights coming down the hill at very high speed. This car just zipped around the corner, didn't quite stop in time, and crunched his front bumper into the concrete bollard there. This young guy got out looking a little bit shaky and I thought, "Oh no, this is not the pilot, is it?" And it was, it was the pilot, and he really didn't look very well.

He kept saying, "I was at this party last night and I've got a terrible headache."

And I thought, "Great." So he unlocked the hangar and we went in. There were a lot of little planes; they were all tiny planes, but he couldn't find his plane. It was like trying to find your car in a car park. We walked up and down rows of little planes. He just couldn't find his plane. We eventually found it. He had left it outside and forgotten about it. The problem was, he had left the windows open and during the thunderstorm, the bottom of the cockpit had filled up with water.

Swent: And when he opened the door the water--

McPherson: Yes, the water gushed out. It was a tiny two-seater. So we got in this plane. He went through his checks and I said "bye-bye" to Harry with tears of anticipated terror in my eyes. There was no traffic control or anything, no one to talk to on the radio, so he just took off and set his navigation for Brisbane. We started talking and he relaxed after a little while. His headache disappeared. And we were just flying; that was the first time that I had ever had the controls of an airplane. I'd never flown an airplane before but he showed me how to do a few things. I was experimenting and he was grabbing the controls now and again.

Another funny thing happened on that flight. He had worked out how many hours it was going to take to get to Brisbane, and he could just about make it with the fuel he had on board. But after we had been flying a couple of hours or so he said, "I'm going to have to go down." A tiny plane, no toilet on there. He says, "Sorry, it's desperate, we're going to have to go down."

And I just looked down to the ground; we weren't flying very high and it was just all rough, not hilly but just rugged scrub land. I said, "Uh huh, where do you suggest we put down?"

So he looked at his maps and he said, "Well, there's an old World War II airstrip that's not too far out of our route." He must have been a pretty good navigator because he found it. And he said, "Well, I'm sure no one's landed here for years. What we'll have to do is to zoom down over the runway; I'll look to the left, you look to the right. See if you can spot any potholes or bushes." So he zoomed over the top of the runway and I didn't see any potholes or any of the little bushes that grew.

Swent: Kangaroos?

McPherson: You're right, you've put your finger on it. There was a bunch of kangaroos that were sitting there right in the middle of the runway. And they didn't move. He said, "Well, we'll have to move these kangaroos." I'm paraphrasing the language he used. So he went across again, just a few feet from the ground and scattered these kangaroos and then we landed. It was funny. Landing hundreds of miles from anywhere for that purpose, and then taking off again. As my pilot said, it was better than risking the slipstream! Anyway, we got to Brisbane, and I gave my seminar the following day.

Swent: What was the name of this pilot, do you remember?

McPherson: Oh, I don't know, it was so long ago. But his full-time job was surveyor at one of the mines. He was just an amateur pilot and did this for fun. And that weekend whilst I was in Brisbane the strike was settled so I was able to fly out by scheduled aircraft to Mt. Isa.

I had a very interesting time there. The chief environmental engineer was Terry Fisher, another excellent engineer. I spent a lot of time underground and on the surface with him. They did have some air conditioning with some rather small and antiquated refrigeration plant on surface, piping chilled water down to the current workings. But that was not even keeping up with where they were working at that time. So it was obviously going to need a major, major increase in cooling capacity for the deeper workings. In fact, Lee, in some of the stopes, the environmental conditions were bad with heat, humidity and, dust. The LHD drivers--do you know what an LHD is?

Swent: I'm trying to think.

McPherson: Load-haul-dump vehicle. The LHD drivers were breathing medic-air. They had cylinders of compressed, medically purified compressed air, and they were breathing through flexible tubes with masks on. That's how bad it was. To that time, that was the largest mine I've ever seen. They were mining lead and zinc in open stopes in one side of the mine and copper in another using cut-and-fill stopes.

It was also the first time I'd seen really large open stopes underground. This is a method of mining where you take a very large block of rock out stage by stage, mining outwards from a center raise. And you just leave it open until you've completely mined out that section. Then afterwards, you fill it in with mill tailings and cement mixes.

Swent: Is this also known as block caving?

McPherson: No, block caving is different. Open stoping is where you leave it open during the time you're actually mining. This was the first time I'd seen really large open stopes. Coming along one of the sub-levels to the edge of a big open stope was an inspiring experience, because you're standing at the edge of this sheer underground cliff, as it were, with a very powerful spotlight in your hand, and whatever direction you shine it, you just can't see anything. You know, there's nothing.

People who have not had anything to do with mining have often said to me, "How can you work underground in a mine? It must get very claustrophobic and tight." And some mines are like that. But standing at the edge of an open stope like that gives a tremendous sensation of spaciousness. It's like being out in space. You can't see anything in any direction. So that was the first time I was personally exposed to very large open stopes in a metal mine.

Anyway, to cut another long story short, by the time I finished my period at Mt. Isa, which wasn't very long, two weeks or so, we had an embryo network of the mine, not on the computer. It was going to take another two years to do that. But we had a skeleton of the mine. It was so big. There were fourteen separate main ventilation shafts, not counting the hoisting shafts. It was a push-pull system, which meant that some of the ventilation shafts had large fans pushing air down and others had equally large fans pulling air up. This had the advantage of tremendous controllability, but it had the disadvantage that it required a high degree of skill to balance the system.

Terry Fisher and his staff used to balance this every working morning of the week. They had a central control console at the main offices and this thing was just like a very complicated electronic organ with keys. These controlled the pitch and speeds of the fans, and they'd do this every morning. They'd just play this thing and make the fans come up and go down. So it had tremendous flexibility but it also had the potential, and this is what was happening, of getting more and more difficult to control. They needed some computational aid to set this thing up automatically. That was one of the reasons I was there. And the other reason was to develop this ten-year plan of research and development so that they could work the deeper deposits.

Swent: And you said it took two years?

McPherson: Afterwards. This was the beginning of it. So by the time I left we had a skeleton network just on paper, not on the computer, but we had an outline of the system, the main airways.

Swent: So you were actually ventilating these enormous caverns underneath the ground?

McPherson: Yes, right. Depending upon where they were working each day. You know, each day might be a different area, so you had to take air from one side and put it to anothe.

Swent: How many employees were there? Do you know?

McPherson: Oh, no, I can't remember, several thousand I think. And Mt. Isa itself is quite a fair-sized town. They built their own power station. It's quite a mining metropolis now.

Swent: Yes, it is, and these are low-cost minerals that they're mining.

McPherson: Yes, lead, zinc, and copper.

Swent: With very variable prices, all of which you had to put into the numbers you were crunching.

McPherson: Yes, right, it had to be economic.

Swent: Were the changes of government coming in during that--

McPherson: That was a relatively quiescent period in the turbulent history of Australian politics. I never got really involved in that time when a lot of the international mining companies got burned in Australia. You know, when the first labor government came in there, and nationalization. A lot of British companies, a lot of American companies, lost money over that. So this is why it was a long while afterwards that--

Swent: Queensland State government got very much into the act at one point also, when Utah went in there.

McPherson: That was in coal mines, wasn't it?

Swent: That was coal mines.

McPherson: Keith Wallace, who started MVS with me, his father headed that up. He was a VP with Utah. He's retiring the end of this year, actually. Old Keith, Sr.

Swent: I don't know, I can't remember the timing on that, but I know that Queensland government got flexing its muscle around then also. This probably was before then. I think Mt. Isa was considerably before. So you didn't have to consider those things?

McPherson: No. I can't even remember talking any kind of politics. Well, one thing I will say, I think that was partly intentional, because some of my Australian friends had warned me--Harry Smedman was one of them--not to talk too much politics openly in Australia.

A lot of the labor relations problems, rightly or wrongly, I don't know, were attributed to people coming from Britain, labor union leaders of the more extreme left type coming from Britain, and developing the same sort of thing in Australia and causing problems, so, again, whether it was true or not I'm not sure, but it was certainly a public impression that people from Britain had caused a lot of problems in Australia. So I was cautioned not to talk too much in the way of politics. Let the Australians look after their own affairs and don't try to interfere was the message I got so I kept away from it.

All right, where were we? By the time I'd got back to Nottingham from that trip, we had this ten-year plan in place, stage by stage, when they were going to do certain things in the way of ventilation improvements, enlargements, and also air conditioning and refrigeration plant.

17. THE RUDDINGTON RANTERS, 1977

McPherson: Nineteen seventy-seven was quite an interesting year in England as well. That was Queen Elizabeth's Twenty-fifth Jubilee, and there was about a week of celebrations right throughout the whole of the country. We had street parties and, oh, it was fun. Parties all over the place going on that week. Three neighbors and myself actually started a little band, just for fun. The trumpet player lived right next door to me. He was a very unusual individual--a tee-total Irishman. At least he was tee-total when we started. By the time we had finished, he was drinking a few beers. I played the piano, we had a clarinetist, and another neighbor was the drummer, just the four of us. We put this little amateur band together for the street parties, and we enjoyed ourselves so much that we began to practice together after that. And we got not too bad. In fact, we played at quite a few dances. We got some bookings. We never charged a penny for it, but it was great fun.

Swent: What did you call yourselves?

McPherson: This was in Ruddington, the village of Ruddington; we called ourselves the Ruddington Ranters. Ranting was about the appropriate description of the noise we made.

Swent: Sounds great fun. How had you managed to learn the piano along with all of the things you did?

McPherson: Oh, this went way back to my younger years back in Ripley Council School when I was seven, eight, nine. I took a couple years of piano lessons back then and hated the discipline of having to do it, so it only lasted two years. But I started playing again when I was a teenager and it just went from there.

18. VISITING PROFESSOR AT BERKELEY, 1978

McPherson: This is bringing us up to some changes that occurred towards the end of 1977. Hubert King, who you recall was then the head of department at Nottingham, retired. He was replaced by a fellow called Tom Atkinson. I came with my family across to California on vacation, visiting Shirley's sister, Audrey. I think earlier that year, just a few months before, Neville Cook had come to Berkeley. I had not worked with Neville personally, but he had been at the Chamber of Mines at the same time that I was down there and I knew him. So I just came up to visit him.

We were going to come up the coast anyway, so it was very informal, and I called him and said we were on our way. So we had an evening meal with him and Jennifer, his wife. The result of that was in the following year, 1978, I came back to Berkeley as a visiting professor for the fall quarter. I actually stayed at the Women's Club. I don't know if you know this building, Lee, on Shattuck Avenue? It's a beautiful old building. It was designed by Julia Morgan.

Swent: Is that the Berkeley Women's City Club?

McPherson: I think it's called that, yes.

Swent: It's on Durant.

McPherson: Durant, not Shattuck. You're right.

Swent: Berkeley Women's City Club. Gorgeous old building.

McPherson: Gorgeous building. So I found myself staying there for three months. And there were two other visiting professors staying there at the same time. One was called Ken Basden. I remember him well because he was a mineral processor, similar interests, and he was from Australia, from Sydney, the University of New South Wales, which I knew quite well by that time, so we had some mutual friends. And there was another one who was an economist from Sweden. I forget his name. But we always had dinner together at night and went out a few times. It was quite interesting living there with lots of little old ladies who became very maternalistic about us and looked after us, and made sure we did the right things, got our hair cut and everything.

Swent: Did you swim in their pool?

McPherson: No I didn't, but they did get me playing the piano a few nights on their beautiful old grand piano. That was fun. Anyway, during that period as a visiting professor, I taught a course on fairly basic mine ventilation, and it went very well.

Whilst I was here, Neville found himself chairman of a committee for the measurement and control of respirable dust. This was a National Academy of Engineering Committee, which was looking into what then was a very important environmental question in mines, and still is. Respirable dust. He asked me to prepare a position document on this because it was more my field than his. I did that and found myself in Washington giving a presentation to the committee. That was useful to me in getting to know some of the top people in environmental work in the U.S.

Another thing that happened during that three-month period here was my first introduction to nuclear waste repository work. Paul Witherspoon, who was then director of the Earth Sciences Laboratory at LBL, Lawrence Berkeley National Laboratory, had work going between the U.S. and Sweden on a test site, an old iron ore mine at a place called Stripa in Sweden. They were using this Swedish abandoned iron ore mine simply as an underground experimental station. It was not intended to actually store nuclear waste down there, but it was used as a test center to carry out experiments, to find out the best ways of characterizing the properties of the rock with respect to heat flow and fluid flow through that rock, granite.

One of the experiments that they wanted to carry out that was absolutely vital was to take a tunnel and to measure the rate at which water was coming through the strata into this tunnel. Now they were doing this already using bore holes, but they wanted something much, much larger, they wanted a full airway. And it was a fairly dry area, necessarily so for the kind of work that was being carried out, so there was very little water coming in, a few drops each minute in this big tunnel. So how could they measure that was the question. They had devised schemes for trying to catch this water and collect it in receptacles and so on.

I was asked to go to a meeting to discuss this problem up at LBL, and I approached it as a ventilation engineer rather than a water drainage engineer. I said, "Paul, why don't we evaporate the water and measure the humidity of the air going in and the humidity coming out?" This could be done accurately. The less airflow there is the more accurate it becomes. So I found myself doing some back-of-the-envelope calculations on this.

Then Paul asked me to write a position paper, a discussion document. So I did that and found myself designing the experiment. So, to carry on that story--I'll come back for other things in a moment--to carry on that story, I found myself spending some time in Sweden during the following year setting up the whole thing, calibrating equipment, getting the routine measurements going. The field engineer was from California, Bob Galbraith, an interesting fellow to work with. He had also stayed with us for a time when I was at the Berkeley Women's City Club. He spent all of that year permanently in Sweden.

And after we'd got the thing working, he sent me the instrument records through to Nottingham. Those were arriving once per week. I analyzed them through our computer systems there and forwarded reports to LBL here at Berkeley. So three countries were involved in that. It was interesting.

Swent: Is this still going on?

McPherson: Oh, that, now? It went on for a few years after that. The Swedes themselves are continuing with the work, but the American side of it has pulled out quite a while back. We're doing that kind of work now entirely within the United States.

19. CLOSER LINKS WITH AMERICA, 1979-1981

McPherson: I came back to Nevada in '79 also to attend the Second International Ventilation Congress. Remember, the first one had been in Johannesburg in '75. That was something that had an impact on me as well. For a number of years there had not really been any major research in mine ventilation in the U.S. Not since the early sixties, and it had kind of lagged somewhat. Howard Hartman, whom I met, remember, way back in '68, was at that congress.

Swent: Was this at Reno?

McPherson: In Reno. And he and a number of other elder statesmen within SME realized that something had to be done in a hurry to bring American standards of ventilation design more in line with what was happening in other major mining countries. And Howard was absolutely terrific. He organized a new committee of SME, Society of Mining Engineers, called the Underground Ventilation Committee, and this galvanized action from lots of company personnel, academics and state employees. He got things moving very, very rapidly. And that had repercussions on me somewhat later on. I became chairman of that Committee in 1988.

During '79 and '80 I had lots of visitors from the U.S. Remember we talked about visitors from Africa and countries of Europe and so on? Those were still going on, but I found myself getting more visitors in Nottingham from the United States. Dick Lucas from VPI, the head of the mining department there, Reg Hardy from Penn State, people from Kentucky, and so on. I was developing an interest in the United States and, I think, vice versa. I also found myself getting kind of restless. I'd been at Nottingham since '68 as a student, and things had moved very rapidly for me.

Swent: Fifty-eight.

McPherson: Fifty-eight as a student, you're right. So I'd been there over twenty years. Very exciting times, traveling all over the world, but, you know, I found myself getting tired of traveling. I'd spent so much time away from home. Shirley had been absolutely terrific about the whole thing, not complained very much at all. But I began to realize I'd missed out a lot on my two kids growing up. I was usually away during the long summer vacations when they were off from school.

And I thought, "It's about time you settled down, Malcolm. Where are we going to settle down?" So there was a period of debate in the family. At the same time, an old friend of mine, Edward Potts, Teddy Potts, another Scotsman, was retiring. He had been head of department at Newcastle University Mining Department in the north of England. Teddy was a real extrovert and was quite a character and very well known. They invited me to go up there for an interview, and in 1980 I found myself with what sounds like a nice choice but actually was a terrible, terrible time. I had a job offer as head of department at Newcastle, I had job offers from Berkeley, from Virginia Poly, from Penn State, and they offered me a personal chair at Nottingham, and this all happened at the same time. So what were we going to do?

Swent: The kind of problem a lot of people would enjoy having.

McPherson: Yes. Old Baden Hinsley, who was still around, getting, as I say, even frailer in those days, he was a lot of help. I chatted this over with him and we went through all the classical convolutions in the family, writing on bits of paper, pros and cons for each job, and adding up the points.

Swent: You didn't computerize this?

McPherson: No, I didn't try to do that. But it came down to a gut reaction at the end. And we chose Berkeley. I find it difficult to rationalize the reasons for it. One was that Shirley had the sister in Los Angeles that we'd visited. One was that I'd known Neville Cook in South Africa, although not really worked with him but knew him. One was that Mike Hood was also here at Berkeley by that time, and he had a good and growing reputation as a young mining engineer and academic, impressive. He also came out to see me at Nottingham. And we found we hit it off pretty well.

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Swent: Had you known Mike before you met him here at Berkeley?

McPherson: No. I knew of him. He'd also worked for quite a while for the Chamber of Mines and, in fact, got his Ph.D. in South Africa. Not in the environmental field at all. He was concerned with rock fragmentation.

The situation that was presented to me was that here was a university with a tremendous mining history at Berkeley, but which had closed its mining program in '62, and because of the tremendous expansion of mining schools in the seventies, was restarting it. Doug Fuerstenau was a prime mover. He was chairman for most of the seventies and he wanted to get mining back. This is why Neville came here, this is why Mike came here, and this is why I was getting an invitation as well. The indication was that we should develop a really strong mining program.

My expectation was that there would be more mining faculty, which was vital. You need about five at the least to give a critical mass and to cover the very diverse spectrum of disciplines within mining engineering. So that would make three of us and the expectation was that others would be added. So because of all these things, I, immodestly, had ideas in mind that I would have liked to see go into practice in the construction of a new mining teaching program. The opportunity was here to do that. So I decided to come to Berkeley.

20. WORK IN INDIA, 1980

McPherson: In the meantime, things were happening still in the rest of the world, and I was asked by a branch of the British government to spend some time in India at the end of 1980. An application had been made by the Indian government for a very substantial input of funds from Britain to upgrade some of their large coal mines and to change them from the old room and pillar system of mining, which was very labor intensive, to mechanized longwall systems.

One of the concerns of the British mining engineers who went down there initially to look at some of the mines was that the ventilation systems just would not handle highly productive faces. So my job was to go down there to assess the situation. I was going to spend about six weeks in Bihar Province, based at the Dhanbad School of Mines, which was rather nice because I knew some of the people from earlier meetings. S. P. Banerjee was there, and still is, their top ventilation professor, a great guy. The principal of the Dhanbad School of Mines was Professor Mawaha, another impressive gentleman.

So, I found myself arriving in Calcutta. There's another story about that. I actually arrived in Delhi on August 1, 1980. I'd had a tight time schedule leaving Heathrow in London, and because of that, I arrived without my luggage. Now, arriving in India without one's personal luggage is not the greatest thing in the world to do, believe me. I was due to get a transfer to an Indian airlines airplane to fly across to Calcutta.

I almost got myself lynched in Delhi airport because everyone was trying to get through customs at the same time. Indians are a wonderful people but they've got no sense of lining up in an orderly manner. So, everyone was trying to get through customs simultaneously. There must have been hundreds of people crammed into that customs hall, all fighting to get through. And I had no bags, I had nothing. I had a tiny briefcase, that's all I had. I'd got nothing to declare and my connecting flight was soon to depart, so I thought in my naïve way, there's no point in me waiting at the back of this mass so I walked around the side. They all started screaming and yelling at me. Oh, my goodness, I thought I was going to be lynched. Anyway, I got through, I got my flight through to Calcutta and spent a weekend there.

The British High Commission in Calcutta were very helpful to me. They managed to trace my luggage for me and get it through somehow or another a day late. An Indian lady, Veena Lakhumalani, from the British Council, was very helpful. In the meantime I just had my travel clothes. However, I was able to buy a shaver, a very old-fashioned kind of hand razor, and some underclothes and that kept me going.

That was the first time I'd been in India. Calcutta is an absolutely fascinating city. It's unbelievable. Then I found myself on this long train journey from Calcutta out to Dhanbad. That, again, was a new experience for me. Traveling through India on old steam trains was quite an education. The whole train was pretty crowded and every time we stopped at a little station, looking out of the window, it seemed that most of the population of the train would jump out, grab twigs off the trees and clean their teeth with the twigs.

I remember almost getting killed on that train as well. I decided I had to go to the restroom at the end of the corridor, so I fought my way down the corridor, opened the door, was just about to step through when I realized that the toilet was simply a big hole in the floor. You looked down there and saw the tracks speeding away underneath you. Oh, it was fun.

Anyway, I had a great time in Dhanbad. It was a really interesting combination of visiting the large coal mines in the area including Chinakuri. It's a very intensive coal mining area in Bihar. My task was to examine the conditions and advise on the changes that would have to be made to upgrade them to a state where they could install a longwall system. I worked with Banerjee in setting up some network analysis programs. They had one little IBM computer so it was kind of limited.

The other thing that was a large problem was that there was only a few hours of electrical power each day. Most of the time there was no power. And when the power was on it fluctuated all the time, so it was quite difficult to keep the computer running for half an hour or so.

Swent: Were you involved in the mechanization decisions or only in the ventilation?

McPherson: In the ventilation, but on the basis of my report they were going to make some major decisions on what could be done and what could not be done. So it was quite important to do that work. I gave quite a lot of lectures to the students at the School of Mines. Very good people, some of whom later came across here and became students in the United States.

I also gave a seminar at the Central Mining Research Station in Dhanbad. It was their Silver Jubilee. That seminar was memorable for me because the power failed during my introduction. I gave the complete seminar in pitch blackness with no slides, no transparencies, nothing.

I made lots of visits to other places, went down to a place called Ranchi to a large research center there dealing with mining (CMPDI), Asansol, and visited the Seetalpur and Dhemomain Mines.

The next major phase was moving down from Bihar right into almost the geographical center of India, a place called Nagpur. And spent some time there visiting the Pathakhera mines and talking to mining engineers. The mines in the Nagpur area were better quality that in Bihar, better managed I think, and with very good conditions. So life was somewhat easier from a professional point of view down there.

However, I got very sick when I was in Nagpur. I'd been in India for over two months by that time, and had done pretty well. I'd taken all the usual precautions, you know, about sterilizing water with chlorine tablets and what one ate and so on. The accommodation at the Dhanbad School of Mines was very good. But they had this little guest house that they put me in Nagpur, and I've never lived anywhere quite so disconcerting in all my life.

I've been in mining camps all over the world, but this was something else. It was in the monsoon season, so everything was dripping wet and covered in green mold and so on. But I was shown into this little room. It was small, and there was a very old bed there, a kind of old moldering wardrobe, and a little bathroom off to the side. They had the usual mosquito curtains round the bed. I pulled these back, I hit the bed with my hand to see how hard or soft it was, and I'm not kidding, drops of water splashed up. It was absolutely soggy. And the place was crawling.

I went into the bathroom; Indian bathrooms in those kinds of houses really have no plumbing. There was a little wash basin with one single cold water faucet, and just a hole in the bottom of the basin. The water falls through the hole onto the floor and then it finds its way across the concrete and gets out somehow or other. I couldn't get the water to turn on at the faucet. I eventually forced it and some droplets of water fell out. It was like something out of a horror movie, Lee. When these few droplets of water hit this little drainage port, it just erupted with these bright orange cockroaches, and black and white jumping spiders. I don't like spiders. These things were jumping waist high. I just raced out of that bathroom. As I say, I got very, very sick there.

I was there three days, trying to recover. I'd not seen any nationality other than Indians all the time since I left

Calcutta. However, a fellow Brit arrived from the British Council in Delhi. Eventually, and with his help, I had enough strength to protest that I was not going to stay there any longer and they had to find somewhere else for me to stay. So I found myself being transferred to another place in Nagpur which was very much better.

There was a great little Indian guy there who was like a mother to me for about a week. He took good care of me and gave me herbal medicines. I don't know what I was taking but it worked, and he brought me round.

I found myself giving more lectures to mining communities around Nagpur for a few days and I visited the MECL R and D unit. Eventually I finished up back in New Delhi where I had to report first of all to officials of the Indian government on my findings. They wanted to know what I was going to say in my main report, I guess, when I got back. So I had a day with them, and also with the British High Commission in New Delhi. So I got back eventually to Nottingham and produced my report. I recommended longwall systems for the mines in the Nagpur area, but indicated some doubts about the Bihar mines.

21. HANDING OVER AT NOTTINGHAM, 1980-1981

McPherson: In the meantime, while this was going on, the Australian thing was progressing. What happened there, Lee, was that Jim Brown, one of my colleagues from Nottingham, went down the year after my visit to Mt. Isa, and took a party of students with him, and--. I'm turning things backwards.

The first thing that happened afterwards was that Kevin Gibson, whom I also mentioned as one of my best graduate students, went down and spent a full two years at Mt. Isa setting up the network, helping them to set up this computer system, and it turned out to be a pretty terrific system. They had the whole mine on the computer in a network fashion. This was an enormous mine so they couldn't get the whole mine on the screen. Well, actually, they could, but it was just a mass of lines. But they could zoom in and look at particular stopes and particular areas of the spirals and the main airways and so on and see what the airflow was.

Swent: At the moment, real time, as they say?

McPherson: Well, at that time, the airflows were measured manually, but you could use those and play games with the airflow distribution. Take what was happening now and then do design exercises, see what would happen "if". And then they could try any number of "ifs". It was great. So we had Kevin down there for two years full time. That is when Jim Brown went down and took a party of students to do special projects.

The year after that I had another of my people from Nottingham, Roger Lee, who I don't think I mentioned before, but he'd joined the team also. He took another party of students down. So from whenever it was, '77 was it when I first went there? All of this illustrates the benefits to students that should arise from consultancy work by their professors.

Swent: Yes.

McPherson: Right through to the time I left Nottingham, we had this permanent presence down at Mt. Isa with special projects teams going backwards and forwards. It was great for the students, and we managed to get things really moving. So that was a success story I think.

Swent: Has that sort of thing been duplicated in other places since then?

McPherson: I've not seen one quite as large as that. This was and is one of the largest mines in the world, so it's not going to be duplicated too often. But certainly monitoring systems and computer control has proliferated, yes, in general.

Okay, one last thing before I found myself leaving the U.K. When it became certain that I was going to come to the States, I had a lot of handing over to do. At that time, the last major research project that I handled for Nottingham was for the European Economic Community, the EEC. This was a project on recirculation of air in coal mines, and we had built up quite a team of graduate students. I had a lot of graduate students when I was at Nottingham. Too many. That was another lesson I learned. But we had this major project with quite a number of students on it. We also had several of our faculty involved on recirculation of air, which was a growing field of research interest. I handed the leadership of that over to Ian Longson, who did a great job afterwards.

Swent: This means reusing--

McPherson: Reusing part of the same air.

Swent: Keeping it underground?

McPherson: Yes, not totally recirculated, but perhaps up to fifty percent recirculation. You don't keep recirculating it without some fresh air going in as well. It's being done now in a limited way at Lead. John Marks has a recirculation system in practice. It's got tremendous other advantages involving the effectiveness and cost of ventilation. It has dangers associated with it as well. Obviously, there must be sufficient through-flow of fresh air to dilute any hazardous gases.

And it is illegal in American coal mines at the moment. It's against the law so we will not see partial recirculation in American coal mines for quite a while. But we're seeing it proliferate in the '80s and '90s very much in other mining industries. Anyway, you're leading me off on another tangent there.

I had major consultancy agreements with some of the companies I mentioned in the U.K., British Gypsum, Cleveland Potash. I recommended Mike Howes to MIM to take over my personal work in Australia. He was at the Camborne School of Mines in the South of England. However, I knew him earlier in South Africa. I was really breaking all my bonds that tied with the work that I had going from Nottingham. So I had Christmas at home in 1980.

Austin Whillier and I had been buzzing backwards and forwards between our two respective countries for mutual visits. The last time I saw him was in January 1981, by which time it was certain that I was going to Berkeley. I'd actually revisited Berkeley right after I'd got back from India. I got home on September 10 from India, '80, and three days later, the 13th, I was here in Berkeley. That's when the job was firmed up and I signed on the dotted line as it were.

Anyway, I was saying that Austin came across for his last trip to England. He stayed with Shirley and me for a few days towards the end of January in '81. By that time it had been confirmed that he had cancer. We'd known of this for about a year. His wife, Mary, practiced in homeopathic medicine, and Austin had just been to Germany to see some specialist. I remember that the advice he'd been given was to eat lots of carrots to get carrotene into his system. So when he came to us he was orange. I mean his skin was orange. He'd been eating carrots all the time. But it was fairly obvious to Shirley and me he'd lost so much weight, he looked as though he

Malcolm McPherson (left), Professor Baden Hinsley, and Shirley McPherson at the McPherson's going away dinner. Nottingham University, 1981.

wasn't going to last too much longer. And, in fact, he died very shortly after that; after I came to the States.

The University of Nottingham gave me a tremendous going-away dinner. Lots of students came back and all my old heads of department. Hinsley came up, he was living then near London with his family. I believe that one of the faculty, Doug Hodges or Ian Longson drove down especially to bring him up. Hubert King came down from retirement in Yorkshire, and Tom Atkinson, so all my three old profs, heads of department were there and lots of other people. It was a great send-off. They gave Shirley and me some wonderful presents including a magnificent set of Staffordshire crystal ware. They were absolutely terrific about the whole thing.

Swent: The Ruddington Ranters?

McPherson: The Ruddington Ranters, that all finished of course.

Swent: Did they have a party for you?

McPherson: Oh, gosh, we had so many going-away parties, it was ridiculous.

22. FIRST YEAR AT BERKELEY: START OF THE MINING ASSOCIATION AND UNDERGRADUATE PROGRAM IN MINERAL ENGINEERING, 1981

McPherson: Anyway, I found myself in Berkeley, full time, in February 1981. There was a tremendous flurry of activity after that of course, both on the research and the teaching side, getting programs going. I had a go at a few courses specifically designed for the students here at Berkeley. I worked closely with Mike Hood. We had a research contract, a very good contract with the Department of Energy during those first two years.

Swent: What was that?

McPherson: It was essentially on ventilation planning. Actually putting all of these numerical methods into practice. As was said earlier, Y.J. Wang had worked on this at the same time I had, in the sixties. But what had not happened in the United States is it had not really gone into widespread practical usage. It was still an academic exercise, whereas in the U.K., in Germany and in some of the South African mines, these things were being used day-by-day by mine ventilation engineers. So this contract with DOE was primarily on the utilization of modern methods of ventilation design and planning.

We did a field case study at Sunnyside Coal Mine in Utah. Mike Hood and I were joint principal investigators and we had some very enthusiastic students working with us. We did a full survey there, that is, measuring pressure differentials, airflows, all the data we needed to put the ventilation network on to the computer. The people at the mine (which was at that time owned by Kaiser Steel) were in the process of planning a new shaft, a major shaft, because they were getting short of air at some of the inbye parts of the mine. They'd costed it out at some $4 million, which I guess is worth a whole lot more now. They were in the process of designing the new shaft because this is the way they'd been used to doing things. They mined as far as they could, got into trouble with ventilation, put in a bigger fan, and eventually had to sink another shaft. This was the way of doing things. It still is in many parts of the country.

So after we'd done a survey, we came back to Berkeley and got networks established on our computer. Mike and I did a full analysis and it turned out that they already had far more airway capacity than they actually needed. They didn't need this new shaft at all. It was a matter of using the airways they had already more efficiently. So we presented that part of the report to Kaiser Steel headquartered in Oakland, and I remember, they were kind of, what's the word, they couldn't quite believe this to begin with, skeptical.

They sent one of the senior mining engineers from Sunnyside all the way out to here, which is, I found out later, quite unusual for a mining company to send an engineer along to a university to see what's going on. And he became convinced that yes, we could do this. And they made the--

Swent: Do you remember his name?

McPherson: Ken Perry. And this is what happened. They cancelled the plans for the new shaft, it saved them $4 million, we were able to supply air for two longwall faces, whereas they'd only been planning for one, and all this by using just what they had more efficiently. The whole purpose of this was to demonstrate what could be done. And it worked out beautifully. The major report to the DOE is up there. So that went pretty well.

Swent: Why had DOE gotten in the act? How did this happen?

McPherson: Well, the provision of energy was a major focus of the Department of Energy. So they were overseeing coal mines, as well as nuclear power stations and all forms of energy at that time. A little later they pulled out completely, or were required to pull out of the coal mining scene, so they no longer funded research in mining.

Okay, I came in February, February 22. I stayed at the University Faculty Club on the Berkeley campus for some time. The rest of the family arrived April 12, and then of course there were all the domestic issues, getting the kids into school. We rented a house in Lafayette and a few months later we bought a house, also in Lafayette. As well as the frenetic activity in research and the development of teaching courses, I found very quickly that I was getting requested to do consultancy work as well.

I'd done some already up in Canada, more work started coming in from Canada, and also American companies, work from Kaiser Engineers in Oakland, Fluor in Redwood City.

One of the things we've not talked about back in Nottingham was the tremendous enthusiasm of the students for what they called The Mining Society, which is a student organization. I found out that in the old days of mining at Berkeley, there had been a very active mining association, also a student organization. So, I thought, let's get this started again.

This was a new program, it wasn't even a program at that time, it was a selection of courses that had not been organized into a named program, so the students found difficulty in, you know, where's their home, where's the focus of all this? So I thought, "Let's get a mining association going." I had a Master's student called Keith Wallace. He was the son of the old Keith Wallace at Utah International. We only had, literally, four or five students interested in mining, so we got together in a back room in the Hearst Mining Building one evening and started chatting about the possibility of reforming, reconstituting the mining association. And they were all tremendously enthusiastic.

Keith was the first student president of this tiny group. An enthusiastic bunch of guys. We decided that we would have an annual banquet, and this, again, was modeled after what we used to do in Nottingham. In Nottingham it was a very formal affair. Everyone wore tuxedoes and made speeches and so on. It usually degenerated into an alcoholic haze at the end of it. Those annual affairs were very important to the department at

Nottingham and I thought, "We've really got to get people coming along at least once a year from industry and from alumni. Then we can tell them what we're doing, they can take a look at us and, hopefully, stay interested."

So we started this going. We had our first annual banquet in the following year, '82. Keith drafted a constitution and that is still the basis of the constitution of the association. We had to have an honorary president as well as a student president every year. So our invitation was to Don McLaughlin. He was the first honorary president of the new mining association. So it was a lot of fun contacting some of the old alumni. Donald himself graduated in about 1914, I think. A lot of these old alumni were back in the twenties when they graduated.

So we got the Mining Association started, and at that time, let me parallel that story what was happening in the department academically. We had these increasing number of courses. Now at that time, when I arrived, there was a quite disparate group in exploration, mineral exploration. They prefer to call themselves something else. They're essentially geophysicists headed up by Frank Morrison.

Swent: Earth Sciences?

McPherson: Engineering geoscience. But essentially they were what an old-fashioned mining engineer would call exploration guys. There was Frank Morrison, and Alex Becker who had arrived shortly before I had from Canada, and then there was a third member, Shimon Coen. They were the exploration group. There was Paul Witherspoon and Narasimhan in hydrology. Paul was and still is an old petroleum engineering guy, but he'd changed his emphasis to water, hydrology. There was Neville, Mike and myself by that time in mining, and then there was Doug Fuerstenau, Kal Sastry in processing, and Jim Evans in extractive metallurgy.

And these were all separate groups with their separate graduate students; no undergraduate program, or just the beginnings of an undergraduate program, but no formal organization. Paul Witherspoon was a tremendous help because he'd been here for twenty or thirty years. I really liked Doug Fuerstenau also. He knew his way around the university so well, and we decided that it would make sense to get an organized program called Mineral Engineering, which would encompass all of these groups, and we'd cooperate in putting together a comprehensive undergraduate program.

I remember we got together one night, all of us, in the Faculty Club at a dinner hosted by Paul and we worked the whole thing out. We got the program going and started recruiting. We had a tremendous influx of students the first year. There were over ninety people who came in back in '82.

Swent: This was all within the College of Engineering.

McPherson: Right. We used something of a subterfuge, actually, to get that very large intake, because it was far, far greater than the quota that were allowed. The quota was based on past performance and of course there was no past performance, so our theoretical quota was zero. It didn't make any sense at all to me. But we got a special dispensation from Karl Pister, the dean, who was always a tremendous help. He was a good friend.

So we found ourselves with a hefty load of students coming in and that was very exciting. That first year went very well for me. Things were coming together at Berkeley, some of the things I'd seen being planned were beginning to happen. Remember I came with the expectation that we would increase the mining faculty to five, which I considered to be the critical mass.

Swent: You had just three.

McPherson: We had just three at that time.

23. DIFFICULTIES IN RECRUITING STUDENTS: HENRY KRUMB LECTURES, 1982-1984

McPherson: Now, two things happened that really killed all those great ideas. One was that Proposition 13 began to bite. Just after I got here there was a complete moratorium on new appointments.

Swent: That was passed several years before.

McPherson: But it was now hitting hard and the state was in a budget crisis somewhat like it is right now. So there were no new appointments. So that killed that one. Just after we had this exhilarating success in our first recruitment effort, there was a tremendous dive in the fortunes of mining industries around the western world. The early '80s, can you remember this? And those big expansions in mining schools during the '70s of which the renovation of mining in Berkeley was part. They just collapsed like a bubble being burst.

Suddenly the country had all of these mining students coming out in addition to those who had graduated two or three years previously, and there were no jobs for them. A lot of people were being laid off and many left the industry. Of course this got across in the media and suddenly we found ourselves with no recruits. No one was coming in to mining. And so there we were, hit by these two things.

We were not allowed to get any more new faculty, and by the time things began to move in the positive direction several years later in mining, by that time we were really in desperate straits. There were very few students in the program and there was no longer any incentive for the university to put new faculty on in mining. The vision of a world class mining group at Berkeley dimmed. I went through a pretty difficult time during 1984 and '85. It was quite a depressing time for me when all this was happening.

Some good things were happening as well. In '83 to '84 I was elected as a Henry Krumb Lecturer of SME. This is a prestigious lecture series where you go around the States and give lectures at various places. I enjoyed doing that.

Swent: What was your topic, or topics. Sometimes they give you a choice, don't they?

McPherson: It was titled something like "The Facts and Myths of Mine Ventilation." I may not have that quite right, but it was something like that. The objective was to contrast between what is reality and the mythology, much of which exists, about how airflows behave in a mine. It was a technical lecture. I varied it from place to place, depending upon the form of mining that was prevalent in that area of the country. It was a technical lecture, but the mythology part of it was fun as well, so it was kind of light-hearted. I tried to make it the mixture of things you need for that kind of program. So it was fun doing that.

Swent: That took you all over the country then.

McPherson: It did, yes. That's one of the funny things, you know. One of the reasons that we decided to settle in one part of the world was because I was tired of traveling and here I am, still traveling an awful lot, even now. But at least it's a week, or two weeks at the most, not the three and four months that I used to have.

We had some good research programs. We did research on coal science, methane flow through coal for the Gas Research Institute and with U.S. Steel with quite big contracts coming through, but rapidly decreasing funding in general for mining research.

Swent: There's really not any coal mining in this end of the country. The big projects that were projected were all stopped at that point by the environmental movement, weren't they?

McPherson: That was another thing, yes, right. We were meeting increasing resistance within the university here and within the community in California. Really, anything concerned with the earth sciences. Earth sciences became not such a good word.

Swent: To say the least.

McPherson: Geology was dropped from the Berkeley list of recognized subjects at high school which would help students get into university. So all of these things were happening which was devastating to us. One could see the effects in the department here as well. The ideas we had and the great start we had at the beginning of the '80s with lots of enthusiasm from the faculty, one could see that waning, understandably.

The students weren't coming in so faculty began to turn to other things. We have found ourselves, this last few years, in the situation of struggling to maintain ourselves with very few students at undergraduate level, but being able to attract graduate students in non-mining areas. Paul [Spencer, Professor Emeritus] and Nari [Professor T. N. Narasimhan] have done well in hydrology, but the lack of funding, the lack of interest, and the bad image of mining had impacted both the graduate level mining students and also the intake of undergraduates.

Mike Hood and I worked hard with the California Mining Association and their member companies, there. We spent a lot of time visiting people with the Division of Mines and Geology in Sacramento and here in the Bay Area, visiting schools, doing just about everything we could think of to get both ends moving, recruitment at one end and job opportunities at the other. We got a lot of sympathy, but that was about it. Really no hard help. So things have been tough for mining at Berkeley over these last few years.

24. THE START OF MINE VENTILATION SERVICES, INC., 1982: NUCLEAR WASTE: EL TENIENTE, CHILE

McPherson: Anyway, going back to 1982, I found myself inundated with requests to do work for mining companies as a consultant, and Keith Wallace, the guy who'd worked so hard to get the mining association going again, he and I had talked for a while about setting up a little company. The crunch came when I was doing some work for Kaiser Engineers on a design for a nuclear waste repository at Hanford up in Washington State. That was headed up by a man called Dave Watson at Kaiser.

Swent: I know Dave.

McPherson: Oh, good. We were chatting about this one day and he was asking me to become involved in this project and that project, and to carry out this study and that study, and this was all at the same time we were getting the programs going here in research. I found myself doing something that I had long promised myself that I would never do. I found myself complaining about lack of time. And Dave made an off-the-cuff comment. I liked him a lot but he was sometimes quite brusque.

He said, "You've got to get yourself organized. Get a company going." Keith and I had already chatted about this so this was an extra little push. So Keith Wallace, Jr., and I became formal partners. I was working here at the university full time, but we established a little office in my--

Swent: He had graduated by this time?

McPherson: He had graduated. We established a little office in my home in Lafayette and we started from there. You remember Shirley's work in nursery schools back in England? She had started doing this in a much smaller way in the home in Lafayette. So it used to be funny those first few months while Keith was working there. We sometimes used to have kids yelling in some of the rooms. He'd be talking to some potential client on the telephone; he'd talk quickly on the telephone and then cover up the mouthpiece so they wouldn't hear the kids screaming. That went on for about nine months.

Paradoxically, apart from the project I had with Kaiser, the work load diminished. We had a little bit of work from the Bureau of Mines which helped us to get some cash flow going. But the big breakthrough for us was a visit from a gentleman called Dick Harig, from Parsons Brinckerhoff. He is now a

Senior Vice President at Parsons Brinckerhoff. Dick came out to see me in this office here at Berkeley. Keith came along also. Parsons Brinckerhoff were putting together a proposal for a large contract to look at nuclear waste repository prospects in Texas, Washington State, that I'd already been working on with Kaiser, and also Nevada.

Swent: They were in different kinds of material?

McPherson: That's right. Salt, basalt, and volcanic tuff. Dick wanted to put together the best possible team he could. He'd known of my work previously from Kaiser and other contacts. Keith and I found ourselves as part of a team to prepare a proposal and to do a three day presentation to a group of gentlemen from Sandia National Laboratories and the Department of Energy. Again, to cut a long story short, it worked out.

Parsons Brinckerhoff got the contract and we got the sub-contract for all the ventilation designs. It was full-time work for several people. I was full time at Berkeley; I could only spend a limited amount of time on this, so we found ourselves putting on additional staff at MVS. We established offices.

Swent: Mine Ventilation Services is the name?

McPherson: Right, we established offices in Lafayette, which we're still in. And we expanded them later on. So things grew very rapidly for us from the company point of view. That was a major contract and lasted for several years. In the meantime, we were intelligent enough not to put all our eggs in one basket. But this gave us a cash flow, a very positive cash flow, so we were able to engage in some marketing and some further business development. Then we found ourselves getting contracts from mining companies all over the place, the States, North and South America.

We had a very big project down in Chile, El Teniente Mine, that John Reed had been at. That, again, was similar in size to Mt. Isa; enormous thing. We worked with Davy McKee Corporation and Ralph Parsons group out of Pasadena on that one. We developed new methods of working, new ventilation designs, and that worked out very well. We spent several weeks down in Chile.

I have lots of anecdotes about that also. We had a rental car burglarized and two of my staff had their passports stolen. That caused us a hectic weekend battling with bureaucracy in Santiago. I also found that Chilean police stations are not my favorite places in the world. We came back and worked for several months on that project. It went very well. We wrote some papers on that project later on.

Swent: What was your position? You're president of the company?

McPherson: President of the company from the start. But a working president. Especially in those early days. I was part of the team that went down and did the surveys. I don't do quite so much of that nowadays.

Swent: No, El Teniente was nationalized.

McPherson: It was part of CODELCO, the government copper mining association.

Swent: So your contract was with them?

McPherson: Our contract was with Davy McKee. Davy McKee was part of an even larger international consortium put together by Ralph Parsons, Inc., of Pasadena. It included a big Swedish mining group, Boliden, and we had some Germans in as well, so it was interesting working down there. It was really cosmopolitan, plus all the Chileans themselves.

Swent: How does this work with your full-time teaching; how can you?

McPherson: I then, as now, try to schedule the longer visits during vacation periods, in between quarters, semesters now, at the university. What I found myself doing as far as MVS was concerned, was we brought more people on and got them trained. They then became more capable of heading these things up for themselves. So by the middle of the '80s it was no longer necessary for me personally to be there throughout all the surveys. My involvement became more of setting up projects, spending perhaps the first three, four or five days on a field study, then coming back and leaving the team to get on with it. Now it's gone even further beyond that. Keith and some of my other senior people are well capable of heading up projects of their own, so we've usually got simultaneous projects going on at different places.

We have worked quite a bit in Alaska, coal mines in the U.S. and Mexico, metal mining, potash mining in Brazil, Chile, Honduras. The majority of our metal mining work has been in Canada and has been all through the decade. We've had very little from metal mining companies in the U.S.

Also, in addition to our large contracts on repositories for commercial nuclear waste, we have done extensive work in redesigning and testing the ventilation system at the defense nuclear waste repository (WIPP) in New Mexico. I think we can claim the credit for getting that system up and going.

Swent: There isn't very much going on for you in U.S. metal mines?

McPherson: That's right. Quite a bit in coal. And that had an influence on my more recent decision about establishing an MVS branch in the East.

Swent: You were recruiting people from among your students?

McPherson: Yes. That's one of the advantages of being at university and having outside work going on. You can pick your best people. We've had others come in.

Swent: You said it was difficult for students to find jobs.

McPherson: Yes, in fact, when things were so tough about finding jobs for students in industry through the '80s it was nice to be able to offer good students jobs.

Swent: Other than Keith Wallace, who are some of the others?

McPherson: Dan Brunner was one of the early ones, who's still with us; Martha Jones, Gary Rogers, Ed Stanek, Justus Deen. Additionally, we have been able to give part-time work and summer jobs to students.

Swent: That's the first time we've had a woman coming in. That was something new here at Berkeley.

McPherson: Yes, she was excellent.

Swent: Was Berkeley your first experience with women students?

McPherson: I had been familiar with having women mining engineers in the Eastern European countries, so it was no great shock for me. It was, and still is, illegal for women to work underground in British mines. There's a very good reason for this, actually; historically, that is. During the eighteenth and nineteenth century, during the Industrial Revolution in the United Kingdom, when coal was being got at any price, then men, women and children were being used almost as slave labor in many mining companies in Scotland, England and, Wales.

There were some very good companies as well, but for those that I'm referring to, the conditions were pretty horrific. Women and children were living their lives underground, seldom being allowed to come to surface; living and dying down there, sometimes in very tragic circumstances. That was the kind of background to the Coal Mines Acts of 1880 something and then the big one in 1911. It was in 1911 that public conscience was aroused so much that mine owners were no longer allowed to use women or boys under the age of 14 underground. That was a long background.

Swent: This was a very progressive development at that time.

McPherson: That's right, and that is what is still on the statute books. That's the historical reason for it. The difference, I found coming to Berkeley, from that point of view, was I found women students in my classroom. This was new for me. I'd never had that before. I had to change some of my old mining stories because of that. I thought I had to at the time anyway. It was something new for me. I found it interesting. It was invigorating to see their enthusiasm and we've had quite a few lady mining students going through over this past ten years. So that was good.

Swent: And they have found jobs?

McPherson: Yes, Jennie Bass works for Bechtel. She's about to get married and then she's going off to Australia. More connections we've made there. Susan Sherlock is with a mining consultancy company just down the coast. Our current student president of the Mining Association is Janet Grimes, a tremendously enthusiastic girl. She's just produced the annual report for the association for this year and has done a wonderful job. So we've had some very good girls come through.

Swent: You said you were cutting your narration. I hope you won't. Don't cut.

McPherson: If I don't, this is going to go on for weeks. So we'd got two things running in parallel now. We've got my work at the university which was and still is a full time appointment, so I spend my time here and that's a lot easier now because I've got such good people.

Swent: You came in at what level; as a professor?

McPherson: Yes.

Swent: So you didn't have to worry about tenure or all that sort of thing?

McPherson: No. One of the things I didn't talk much about was my progression through the academic hierarchy at Nottingham, and during those years when I was on the faculty there. I think I mentioned that I started as an assistant lecturer, at the bottom of the ladder. By the time I left, my title was reader, which means something very different in the British university than it does here. A reader is a senior professor with particular responsibilities in research.

My next natural move would have been head of department. That was the time when I was getting restless and had all these job offers. So, in the American context, I already was a full professor, in American terminology, at Nottingham. That was a must before I could come here.

Swent: How does this, having this business that you built up, does this enhance the university work? Does the university look kindly on this, or do they care?

McPherson: I remember at the time we started it was in that early part of the '80s when the industry seemed to be going down the tubes. I discussed it with my immediate colleagues here because I was in that schizophrenic situation of not being able to handle the consultancy work I was getting, and yet it looked as though the industry was going to disappear for a while. Did it make sense to try and start a mining consultancy business at that time?

I got a lot of encouragement from them, but I don't think any of us realized just how well it was going to go. Because it seemed a crazy time to start a mining consultancy business, mining was going downhill so rapidly. I think it probably would have died had it not been for that nuclear waste work which has gone on pretty well throughout this period of time. Our work in nuclear waste now is probably only about ten percent of the turnover of the work at MVS. We no longer do any work for Parsons Brinckerhoff. That contract finished maybe a couple of years ago. We're no longer directly involved in the commercial nuclear waste repository. The one in Washington State died during the Reagan years. President Reagan signed a bill eventually, that the country should concentrate its efforts in one site for a commercial nuclear waste repository. And this was going to be the one in Nevada. So the one in Washington and the one in Texas--

Swent: Did your research have anything to do with the decision?

McPherson: I don't think so.

Swent: You didn't make any recommendations on which was better?

McPherson: No, I think those were primarily political decisions rather than technical issues. But, anyway, the emphasis was put on the Nevada repository, and we worked on that for a long while. But, again, because of political difficulties, that has been slowed down for the time being.

I'm jumping backwards and forwards now. Those international congresses, the first one in Johannesburg, the second one in Reno, Nevada, that I've been so much a part of. The third one was back in the U.K. in Harrogate in 1984. So I found myself visiting back in the U.K. professionally. The one after that in '88 was in Brisbane, Australia.

It was nice to get back to Brisbane. I took Shirley and my daughter Alison on that trip. Keith Wallace and Dan Brunner came with us because we were developing work in Australia, we were exhibiting in the exhibition during the congress. That was hilarious because Qantas lost all of our equipment and we had a bare stall. We had to make things up as we went along.

25. WORK ON THE (NUCLEAR) WASTE ISOLATION PILOT PLANT (WIPP), 1988-1991

McPherson: While we were in Australia, I had a telephone call one night in the hotel in Brisbane. It was a call from a DOE contract manager working out of Albuquerque in New Mexico. And it was concerned with the defense nuclear waste repository which was still being developed, physically developed, down near Carlsbad in New Mexico. This was known as the Waste Isolation Pilot Plant, or WIPP. They wanted some work done on testing and balancing of the ventilation system they had already established. And they requested us to bid on this. But they wanted the bid, typical DOE government rush, they wanted the bid within a couple of weeks. And there we were in Australia, the primary people from MVS. So we found ourselves in the hotel bedroom there putting together ideas.

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McPherson: Keith and I got our heads together and we composed a verbal type response, which we then relayed just by telephone conversations. Really, this was a holding operation to give us time to get back home and do a full proposal. And, again, to cut the story short, we found ourselves with a contract with DOE through Westinghouse, the main contractors on the site, to take a look at the ventilation system in this defense nuclear waste repository.

We got a team down to WIPP and carried out tests on the ventilation. We found that the ventilation system really was not adequate, it had not been well put together. So that was quickly followed up by more contracts for full scale ventilation surveys and redesign. Those have gone on ever since. We've had about three years of fairly intensive work down there in New Mexico, revising and putting into operation the ventilation system. In fact, we had some fun times down there.

They have a four-shaft operation going down into salt, a deep salt deposit. One of these shafts is where nuclear waste actually goes down. It's called the waste shaft. And because of the danger, the possible remote danger, of escape of radio nucleides, the top of this shaft is totally enclosed by a big tower, with the winding hoists sited within it. This tower necessarily has to be put under some air pressure by the ventilation system. We were told that it was designed to hold 15 inches of water gauge, a measure of pressure differential, but they really did not want us to go above 6 inches of water gauge to keep a safety margin.

So when we started one of our early tests, Keith and I decided that we'd play it real safe. We would not take the tower pressure above 2 inches water gauge. There are lots of controls underground including automated regulators. It's a great facility but it is essentially experimental. We would vary the regulators, vary the fans and so on, gradually increasing pressure differentials between various parts of the system, including across this waste tower. And we got to 1. 8 inches of water gauge, quite close to where we were going to stop.

I was actually at the top of the shaft. Martha Jones, who was now by this time Martha O'Leary, she'd got married, she was with me. I think Dan Brunner was underground and Keith was at a main regulator underground, all operating their assigned controls. When we got to 1. 8 inches water gauge, the sheathing on the tower started vibrating, the whole tower. The cladding started vibrating. That's not too unusual. Sometimes you go through a resonance point when increasing a pressure differential. I was about to communicate with Keith to take it up just a fraction more, and suddenly there was a sound like a dozen machine guns going off. Everything was rattling, the whole tower seemed to be vibrating very violently. I could hear someone screaming up on one of the upper floors. So I shouted to Keith via telephone, "Close the regulators, kill the fans."

He reacted quickly and within fifteen seconds or so the pressure dropped and things died down. What had happened was that some of the seals on the inside of the tower had given way. This was aluminum paneling and some had given way along the seams and were flapping very noisily; this was the machine gun effect. The whole thing just was not up to taking that pressure. The main hoist was up on the second or third floor. The hoist is in a room which also has airlock doors, again, to control the air pressure. When all this noise and vibration started, the man in charge of the hoist panicked, rushed to the door to get out, but because of the failed seams, air pressure on these doors had sealed them and he couldn't get out. He thought the whole thing was coming down. So we had to go up to reassure him and assess the damage.

So there was a major inquiry. This incident happened about two o'clock in the morning. We worked through the night, and very early the next morning we had all the major managers and engineering staff in for a meeting and went over this whole thing. It was realized that the whole ventilation design had to be completely revised. So we got the job of doing that, and that's gone on until very recently.

Swent: This was a pre-existing mine, was it?

McPherson: No, it wasn't, it was especially sunk for nuclear waste. Over this past few months, we've been through a rigorous review procedure. A panel of ventilation experts from various parts of the country, chaired by Howard Hartman, came down to New Mexico and reviewed the whole system. They spent two separate periods down there and gave it a real thorough investigation. We came through with flying colors. They confirmed that the system is safe. So they're actually in operation now, just a couple of weeks ago.

Swent: But not at up to 15 inches.

McPherson: No, the whole tower was reinforced after that and we tested it up to 3 inches of water gauge, but the design is such that we will not go above 2 inches. That was an interesting experience.

Swent: Once again, what's the acronym for that?

McPherson: WIPP, waste isolation pilot plant.

Swent: BWIP is some other place?

McPherson: Yes, that was the one in basalt in Washington State.

Swent: So WIPP has been an ongoing project for you for some time?

McPherson: That has been ongoing since we had that interesting time in Brisbane working out a response over the telephone. The major contract now is coming to an end, the major contract being the redesign of the ventilation system. We have an ongoing arrangement with them to revise the surveys and carry out checks.

That whole project has been one enormous research project because everything has been new. We've had to devise systems that have never been even thought of before. We've produced papers on it, and it's been a terrific experimental mine as far as we're concerned. They are now producing automatically the operating characteristics of the ventilation system, the pressure-volume diagrams, and the natural ventilation characteristics. Monitored information is recorded minute by minute, then we can analyze it on the computer and plot out all of these diagrams. Things that old Baden Hinsley and some of those old fellows would have been fascinated to see. They used to theorize about it but were not able to show it on a continuous basis.

Swent: So this will have some spin-offs into other things.

McPherson: It will have a lot of spin-offs. Its rather like designing a racing car. We have all the problems and we solve them, and a lot of the spin-off finishes up a few years later in the car that you're driving on the freeways. This is the same sort of thing. We're getting lots of spin-offs that will benefit mines and other underground facilities.

26. PROJECTS IN CANADA, MEXICO, USA AND BRAZIL

McPherson: Okay, so lots of exciting things were happening in the company, and whilst this had been going on, we've had other projects all over the place. A big one up in Yellowknife in Canada, at minus 40 degrees Celsius in the headings.

Swent: That's uranium isn't it?

McPherson: No, it's gold, the Con mine. Projects for U.S. Steel at a large coal mine in Alabama. We've had a major coal project down in Mexico. That's another interesting story. It started as a request to go down and take a look at their methane problems. They had a new coal mine, but very very gassy. Quite shallow, only about 150 meters deep, but extremely gassy.

Swent: Where is it?

McPherson: The nearest town is Nueva Rosita. The mine is called the Pasta de Conchos Mine. It's in the Coahuila Province in northern Mexico, about one hundred miles south of the Texas border at Eagles Pass. Dan Brunner was with me the first time we went down there on a reconnaissance--to talk about the project and to set up the contract. We went underground, and it was a very old fashioned room pillar system. They were using two continuous miners which were rather old. I remember going into one of the headings and the machine was stopping and starting and stopping and starting. Every time it stopped I could hear the hissing of the gas. You could hear the hissing out from the face. I got my methanometer out, which reads one to five percent methane. Methane becomes highly explosive between 5 and 15 percent methane. And when I pressed the button the needle just shot across, just slapped against the stop at the end. It was way, way up into the explosive region. And they were working in there. Mining machines were working in there. Very seldom have I been nervous underground but I was nervous in that situation. It was just a disaster waiting to happen. So the first thing we had to do was to get some good airflows down there. An immediate emergency thing. We were able to do this by concentrating the airflows to the actual working places and cutting down some of the leakage. Then we embarked on a longer term project with them. This involved recommendations that, if they were going to work this mine at any kind of profit, they had to have a methane drainage system. They had to put bore holes in and drain the methane out of the coal for several months before they mined each individual district; one, and two, they needed a new shaft. At that time, and still now, they had two drifts and one fairly small shaft. They needed another shaft way down in the inby side of the mine. Both of those recommendations were big blows to them. I remember the management faces dropping when I came out with these two primary requirements. They were very dismayed because these were both expensive things to do. So there was a period of several months when they were making their mind up whether it was worthwhile to do this or whether they were going to close the mine. It was virtually impossible to go on with development of the mine as they were. They were able to mine a little bit of coal in the meantime with the improvements we'd made, the bandaid things we'd done, but eventually they decided, yes, they were going to do it.

Swent: Is this a nationalized company?

McPherson: No, it is not nationalized. I believe it's owned partly by ASARCO from the States and the rest by a major mining company in Mexico who have a number of metal mines as well. The name of the main company is Industrial Minera Mexico, SA, while the local group is Carbonifera de Nueva Rosita.

Anyway, that got them moving, and then they asked us to undertake a larger project. This was to design and oversee continuing improvements on ventilation, to design the new shaft for them and to design a methane drainage system. I'd also talked at length to the mine manager about improving their method of working which was so antiquated with old fashioned timbers and steel girders and so on. So they asked us also to undertake a review of their mining methods. And all of that was just too big for MVS. It was going way beyond mine ventilation. We talked to Dick Harig again of Parsons Brinckerhoff, this big national company, and they agreed to do the shaft design with us. So we found ourselves turning the tables and they were now working for us, for our little group. We also pulled in a group from Salt Lake City who specialize in methane drainage led up by a great guy, Jeff Schwoebel. We got a team down there, people from Parsons Brinckerhoff, and Resource Enterprises (this is the methane drainage group), and got things moving on all fronts. And, again, to cut a long story short, the methane drainage system is now fully operational. The methane is pouring out of holes drilled up to two thousand feet in length within the seam. It's all being tapped into pipelines and is being taken to the surface and is flaring off. They are producing 1.5 million cubic feet per day of methane at a purity of 96 to 98 percent. The methane concentration in the main returns is down to less than half of what it was before drainage commenced. We're trying to convince them to use the gas because it's such high quality gas, but they're just happy to get it out of the mine. So it's flaring off in big blue flames going into the sky.

Swent: Which they couldn't do a hundred miles farther north.

McPherson: No way. And the shaft work is progressing, so everything is moving down there. They're a little bit slow on getting the new methods of working because that means major capital expense on new machines. They're also a little bit reluctant to use modern methods of roof support, using roof bolts. Much of the resistance is not from the management but from the miners themselves, who have been used to having massive timber props and steel girders they could see. But when you put roof bolts up you really can't see very much as visual support. There's an educational job to do there. So that was another good project.

What I've been doing here, really, is just picking out a few big projects that we've been involved in from MVS. There have been many others; trona mines in Wyoming. The Green River area of Wyoming. Hot summers and extremely cold winters. We had to devise some fairly creative methods of heating the air up there in the winter time.

Swent: How did you do that?

McPherson: Well, heating the volumes of air we have to deal with in mine ventilation is very expensive, as we know all too well in Canada. They have these warm summers in Wyoming and very cold winters. With the mine engineers, we thought, why not heat the strata up during the winter. It had, in fact, been done before in similar circumstances at other mines. So we devised a system where we take the intake air, not immediately into the current workings, but circulate it through series or parallel configurations in old workings. In the summer time that strata gets heated up by the air, and in the winter time the strata heat comes out in a controlled manner and warms the air up. So, you know these storage heaters that contain concrete blocks you can buy in cabinets for domestic use in a home. You can heat them up using electricity over night when power is cheap? It's like doing that on a mountainous scale. We heat the whole strata up during the summer then use that heat during the winter when we need it. It gives them free cooling in the summer and free heating in the winter.

Swent: You're taking the heat out in the summer from your working place then?

McPherson: Right, and using it to heat the cold intake air in the winter. Just like a giant domestic storage heater. I'm much more interested doing these kind of novel or research oriented projects with industry. We have to do a lot of the routine stuff to keep the cash flow going. But I find myself doing very much less of this routine setting up work now. The MVS engineering staff are so good at doing this. So I tend to be involved more with the research oriented projects, which is a lot of fun.

Swent: Do you publish things as a result of these as well?

McPherson: Oh yes, yes indeed. We've had a number of publications out of these jobs. There is one difference, of course, between university research and private company research work. Here at Berkeley and, indeed, at most American universities, we reserve the right to publish freely, and that's sometimes a problem with getting certain kinds of projects into the universities. With private consultancy, you always have to have the permission of the company to publish anything.

Swent: That's what I was wondering, if they like to have you give away their secrets.

McPherson: With only a few exceptions, we've had no difficulties on this. In fact, most mines, once their problem has been solved and it's not been something that's been routine or has been done before, are quite proud to publicize the fact that, "Hey, we did this." So we've not had too much difficulty. It's a matter of creating the right atmosphere, talking to people, using some common sense about what goes into the paper and keeping everybody happy. And, of course, any papers we write are always sent to the company, and that sometimes includes government people. That includes the work at WIPP and DOE and so on. We always send copies for them to review. They make comments and we incorporate those.

Swent: Have you ever been turned down on any?

McPherson: I don't think I've ever had anyone say, "No, you cannot publish this paper." Comments and suggestions, yes, certainly, which we always incorporate, but I can't remember anyone saying, "No." I know of some other people who have this difficulty, but I've not come across it personally. Again, I think that it is a matter of plain common sense; if anything is of a sensitive nature then we would not even suggest putting it in a paper for publication.

I've been talking a lot about the company, not much about the university, so I guess we should get back to that.

Swent: You didn't say anything about the Brazil project. You might just want to at least say where it was anyhow, a little bit about it.

McPherson: This was another potash mine. From Cleveland Potash in England to Brazil. One side of the world to the other in potash. It was a few hundred miles north of Rio de Janiero, near a place called Aracaju. The mine was called Taquari Vassouras, owned by Petrobras Mineracao of Brazil.

Swent: Maybe it wasn't particularly significant. I don't know. It's just that Brazil sounds more glamorous.

McPherson: Well, it was an interesting project. They actually had very similar problems to the ones I'd worked on at Cleveland Potash in northeast England. Not so deep, but with a very high temperature gradient in the strata. The strata was hot. So it was a very hot mine but they were using no air conditioning at all. The airways were large and with good ventilation. They had both surface and underground fans, but because the airways were so large, the air velocities were quite low, and temperatures were above 40 degrees Celsius in the headings.

In fact, I remember Keith, Dan, and I being in one heading that used what we call an exhaust ventilation system. The ventilation was drawn back through a steel duct with an exhausting fan at the end. Air passed into the heading slowly, went across the heading machine--they were using big Canadian heading machines--and then the air came back along this steel duct. The air was already hot going in, and flowed sluggishly along the heading with really hot strata, went over this powerful machine, and then was pulled into the end of the duct without passing over anybody else. The air in that duct was so hot that you couldn't put your hand on the steel ducting. Oh boy, that mine was hot. We drank a lot of water. We teased Keith unmercifully one day when, after coming out the mine, his rubber boots were brimming over with his perspiration.

So, we designed improvements to the ventilation and recommended air conditioning units, refrigeration units. We actually tried to persuade them to put in another shaft and a centralized refrigeration system which would have been much more efficient, but they didn't have the money to do it. They were so short of funds. Inflation was horrific, of course, and still is in Brazil. So we finished up with a recommendation of spot coolers, smaller refrigeration units in localized parts of the mine.

The last time I went down there, I gave a presentation at the company headquarters in Rio de Janeiro. We had initially recommended two new shafts, and that was then cut down to one. The Brazilian engineers we were working with kept saying, "There's no way we're going to get even one shaft." So I went down to Rio specifically to make a case for at least one new shaft. The senior people were very sympathetic but they simply did not have the money. So we had to make do with what shafts we had and the air conditioning system that we had designed. So that was that project in Brazil. Is there anything else you want to discuss about MVS?

Swent: I guess perhaps not. It's an established concern by now.

McPherson: Yes, the situation now is that we still have the office in Lafayette which is the headquarters. We now have a second office down in Fresno, and we are establishing an office in Virginia. The coal work that we've done has expanded, yes, but I've also been conscious of some resistance in the East about "Employing people from California to work in coal mines? What do Californians know about coal mines?"

One can sense that. Despite the fact that all my beginnings were in coal mines, that resistance is still there.

The geographical distance is also a problem. Nevertheless, we have done quite a bit of coal work and are continuing to do coal work in Colorado and Utah and in some of the eastern mines. Having an office out there, establishing people out there, is obviously the thing to do. That was part of the decision to locate an office there.

Swent: Where is your office there?

McPherson: In Virginia? In Blacksburg. And it's just a start at the present time but we believe that it will expand.

Swent: Do you have a full-time staff there?

McPherson: I've got just one guy to begin with, a native Virginian. Again, an old student, who was a graduate from Berkeley. He got his master's degree here, actually working under Tor Brekke in civil engineering, but he did a ventilation course with me. He worked for a year at MVS after he got his master's. That's how he got to know our people. Then he went to VPI to get his Ph.D. and he's been working in the construction industry for a while, geotechnical work, but now he's anxious to get back into mining. We talked a few months ago, and when he heard I was going across there he got very excited, so he's now on board.

Swent: And his name?

McPherson: Gary Rogers. We hope to do great things together out there.

Swent: Wonderful.

27. PHILOSOPHY OF TEACHING: COMPUTER SOFTWARE

McPherson: But this is getting one-sided, we're talking all about the company.

Swent: And not the university.

McPherson: My great love is teaching and research, but I guess that because of my family background and because of the way I started working in the mines before I went to university, I think this has given me the urge also to work with industry. I have done this right throughout my career. I love teaching and I love research but if I were doing nothing other than that I think would go crazy. I've got to be out there doing the job as well as teaching and researching.

Swent: It makes an ideal combination, doesn't it?

McPherson: Yes, I feel uncomfortable when I'm required to teach, as is sometimes necessary, teach material that I've not been out there and actually practiced in industry. The basic subjects, you know, fluid mechanics or thermodynamics, that's fine, but the teaching of engineering application, design, and practice is different for me. When I can't tell stories, when I can't give anecdotes and I can't honestly say that I'm really involved in doing this, then I just don't feel comfortable talking to people as a so-called expert. If I've not done it, then I don't feel competent to lecture on it. This is something in me. So I've always had to have that combination of teaching and practice.

Swent: I'm sure you're a much more effective teacher because of it.

McPherson: And it works both ways. Being at a major university does have a feed-back on the contract work as well. The thing that has to be balanced, of course, is one's time. My university appointment is and has been full time. So I find a lot of the field work, when it's necessary for me to go, is concentrated into short periods, and particularly during university vacation times. And company work also at nights and weekends. I've got a very long-suffering wife.

I don't think it's worth talking any more about individual projects all over the place, across the nation. Some of our business is selling computer programs. A lot of the pioneering program development that I did at Nottingham is now in superduper streamlined form, user friendly and employing personal computers. Our programs now are the most widely used for mine ventilation planning throughout North America, and Australia as well.

Swent: Are these patented?

McPherson: We looked at this, and apparently one cannot patent a computer program. You can put out a copyright on manuals but there are two ways you can go with the programs themselves. You might have a program which is so popular to everybody and anybody like the Lotus 1-2-3 for example, the spreadsheet programs, or CAD programs. Then there's a big enough market that the software companies will sell it unprotected, knowing that it will be copied, but enough people will buy it to make it profitable.

On the other hand, if you're supplying programs to a very specific market as we are in mine design, mine ventilation, then you've got to protect them in some way. So we sell our programs in a protected format. That is, they cannot be copied easily. We have little devices in there which prevent them from being copied. So program sales are now a healthy turnover for us.

Swent: You sell the disk itself?

McPherson: Yes, diskettes, with user manuals. It's amazing how things work out. We started selling programs simply as a public relations exercise. This was five or six years ago. We wanted the company name to be more widely known and we saw this as a way of making contacts for the kind of work that we were really there for, consultancy, mine environmental system designs, and so on. So we started selling programs, VNET (ventilation network) programs, at $350 each.

The nearest competitor at that time was Cerchar in France. They were also trying to sell similar programs in the States at the time. They were charging $3000 for their program and they had designed it for quite sophisticated hardware. To run the Cerchar program you needed about $30,000 worth of hardware which you might find at main offices and so on, but you would not find in local mine offices. We specifically designed our saleable versions of the VNET programs for small personal computers. And we sold them at a giveaway price. We actually didn't make any money on them, and didn't intend to initially, it was just PR.

Then we found them becoming very popular. Suggestions for improvements to make them more user friendly started coming in. So we went into it in a more commercial way. We still only charge, I think it's $750, for the latest version. But we have large sales throughout North America and Australia.

28. DEVELOPMENTS AT BERKELEY THROUGH THE 1980'S

McPherson: Again, you have taken me off on a tangent, Lee. Let's come back to the university and what was happening here. We were having these problems of recruitment and faculty began reverting back to how it had been before '81. Going their own way with non-mining-oriented types of subjects. The students that we've had in the undergraduate school I've found to be absolutely terrific all the time, all the way through, and it's been due to them mainly that the [University of California] Mining Association has derived its strength. That strength has grown better and better despite the small number of students.

I just pulled this old banquet menu out of my files last night to remind me of the honorary presidents and student presidents we have had. You'll know many of those names down there. We have had some key figures taking a interest in us and this has been a big help. A big help to the students as well as to the department. The annual UCMA banquet started off as a small student affair and has now turned into a major annual event for the department.

Swent: Yes, so this was the tenth one that we had last April, wasn't it?

McPherson: Yes.

Swent: A very distinguished group of people there.

McPherson: Yes, it's been a good ten years for the Mining Association.

Swent: Let's see, after Donald McLaughlin in 1982, Plato Malozemoff was the second honorary president (1983), then Alexander Wilson (1984). The column on the left gives the honorary presidents and the one on the right is the corresponding student presidents?

McPherson: That's right, so Keith Wallace, Jr., was the first student president.

Swent: And after Alexander Wilson, you had Harry Conger (1985), chairman of Homestake, then John Havard (1986). John is going to be presented with his oral history at the next banquet.

McPherson: That's good, a great guy. Jack was the fellow who recommended me to do the Henry Krumb series of lectures in 1982-'83.

Swent: He was president of SME earlier, I think.

McPherson: Then we had Simon Strauss (1987). Simon had spent a semester at Berkeley right next door to this office. He gave a course on mineral economics. I believe he was also preparing his book Trouble in the Third Kingdom [Mining Journal Books Limited, London, 1986] at that time. After that came Wally MacGregor (1988), who was a member of our Mineral Engineering Advisory Committee, and Brian Tucker (1989), state geologist for California.

Swent: In 1990 you had John Neerhout of Bechtel, who is now in charge of work on the Chunnel, and then Ray Beebe (1991) of Homestake. That is a very distinguished group you have there.

McPherson: Yes, right. So that really brings us up to what's been happening over these past few years. Because of the problems of the industry and the associated difficulties in student recruitment through most of the '80s, we have been struggling to maintain a mining element for a number of years. We only have two faculty with a real interest in mining anymore, Mike Hood and myself. And we've been working hard to keep a mining interest in the department, supported by a few enthusiastic students.

At the graduate level, the funding for mining research was totally inadequate, but it was available for hydrology and, more recently, petroleum engineering came back. That's another long story. We struggled hard to get petroleum engineering back, after twenty years, into the department. We now have George Cooper and Tad Patzek heading up the petroleum effort. So that's going well.

Oh, let me tell you something else that's significant about my period at Berkeley. One of the things that I did not appreciate as a visiting professor in 1978 and never came to terms with as a permanent faculty member at Berkeley was the office and lab accommodation in the Hearst Mining Building. The Hearst Mining Building is beautiful, an architectural gem from the outside and in the foyer. But get beyond the foyer and it's a mess, little partitions and offices that look more like monastery cells. The ironwork devices to open the windows appear to have been copied from Agricola's De Re Metallica. This is having come from a very modern building in Nottingham with thick carpets on my office floor. Rooms lined with oak bookcases, automatic curtains, projectors, and all that great stuff, so when I came to this--

Swent: Sort of the opposite of what the stereotypes are, isn't it? We like to think of America as being so modern.

McPherson: Well, I was not happy with the accommodation in this externally beautiful building. I remember talking to Don McLaughlin about this. We actually had a meeting in his home at 1450 Hawthorne Terrace, Berkeley, in his little study there. This was in 1982. Don also brought in the previous university architect. Frank Morrison was the chairman of the department then, and I dragged Frank along to this. We discussed ideas on how the building might be renovated.

Sometime later, I guess in about 1985, I found myself on a major campus planning committee, SACI, the space assignments and capital improvements committee. I was actually recommended for that by Doug Fuerstenau, bless his heart. I spent some five or six years on that committee.

Swent: To no avail, I see.

McPherson: Wait for it. As a working member of SACI, I involved myself heavily in the planning of other buildings and assignment of grant money for improvements here, there, and everywhere, and the many other things that committee now does. Whenever capital improvements came up, I took every opportunity of mentioning the Hearst Mining Building; for example, the fact that we've got a magnificent lecture theater across there which is kept locked because it's seismically unsafe, and all the wonderful things that we could do but were not able to do because of the poor accommodation; people doing their laboratory work in other places, including LBL [Lawrence Berkeley Laboratory].

The department, as you know, is one of materials science and mineral engineering. A lot of materials science work could not take place here because we couldn't get clean enough rooms and so on. So I tried to balance my tactics on the committee, not making myself too much of a pain nor being too obvious, but at every opportunity the Hearst Mining Building was mentioned. Gradually, it came towards the top of various lists and we were seriously being contemplated for major capital funding. In '89 when the Loma Prieta earthquake came along, everyone got very, very nervous. A high-level committee was set up to look at seismic safety on campus. All through the '70s into the '80s several studies on the Hearst Mining Building had been carried out under various chairmen in the department. Each one showed that the Hearst Mining Building was unsafe.

So when the 1989 earthquake came along, people got very nervous. Seismic safety committees were set up, buildings were reviewed again, and it was reconfirmed that the Hearst Mining Building was not a safe building for people to work in. I thought, "We will never have a better window of opportunity!"

With the help of Jim Evans, I put together a position paper which was entitled "A Call for Action." We got Karl Pister, the dean of engineering, on our side on this. Jim Evans, who was then chairman of the department, worked with me on it. Things started moving. Jud King, the provost, now heads up a major steering committee that I'm still on, and the planning of the renovation of the Hearst Mining Building is well under way. Everything is moving in the right direction. We are on the list for major input of state money in '95, '96. We've got $26 million there, earmarked for the Hearst Mining Building. We need about another $12 to $14 million from private funding. We have had the initial stages of the architectural study done.

The first stage of the architectural design work has been completed by a local company known as ED2. That prefeasibility stage has been an interesting marriage of programmatic needs of the department, aesthetics, and compliance with modern seismic codes. The next main phases are the private fund raising and the major architectural study. But at the moment we are scheduled to begin reconstruction in 1996. That, of course, might slip. Everyone will move out and the inside of this old building is going to be taken apart inside, but leaving the foyer alone. The Hearst Memorial Mining Building is a national monument as well as a state monument. So we cannot touch, indeed we don't want to touch, the outside walls, and we don't want to touch the foyer, but all of this rabbit warren that we're living in behind the lobby is going to be taken out and we're going to have a brand new internal building.

Something I've been pushing for is that we get back closer to the original design of the building by its architect, John Galen Howard. Until some time in the '40s, there was a large quadrangle in the middle of the building with an atrium that went all the way up to the glass roof, joining up with the magnificent lobby. Ideally, I would like to get it back.

Swent: That would be lovely.

McPherson: People blow hot and cold about this. It's a lovely idea but the argument is that we need the space more than we need an atrium. It is a conflict between pragmatism and aesthetics. I think that a good compromise would be to have a partial atrium from the top of the second floor to the glass roof and overlooking the lobby. This would use relatively little floor space and the sensation of spacious grandeur on coming through the main doors would be breathtaking. My main regret is that I will not be here to see it through.

Swent: Do you think a renovated building will stimulate more students?

29. THOUGHTS ON ENVIRONMENTALISM AND THE TURNAROUND IN JOB OPPORTUNITIES

McPherson: I think recruitment into any mining program is going to be very much a function of the public image of the mining industry. The disastrous image that we have had is, I think, just beginning to level out and, hopefully, become more balanced again. The problem is that for many years the kids in our schools have been well versed in "save the whale" or the "evils of acid rain," but are completely and utterly oblivious of their dependence on raw materials. Neither they, their teachers, nor the general public realize that were it not for the mining industries we'd all be living in caves. That brainwashing has gone on for these last two decades. But the "evils" of mining certainly have been well publicized.

Swent: Everybody knows about that.

McPherson: Right, but we've got to get over that. And maybe we are beginning to see the re-establishment of a balance. I hear a few more people beginning to accept that if we go too far along the farther reaches of the environmental lobby, then it's going to impact life styles to an extent that most of our population will not accept.

For example, the fact that it's becoming almost a sin to drive one's automobile now. It's becoming so expensive to bring your automobile to the campus. It's about $800 a year just for the privilege of looking for a parking place. The sensible approach is to hasten the development of clean engines for cars and then to encourage people in urban areas to use those cleaner vehicles. The scrambling for popularist environmental votes by some of our politicians can only harm the economy of California. We are already seeing this with more and more companies leaving the state.

Once people see their standard of life really being adversely impacted by these things, then I think we will see them standing back and thinking about a more sensible balance. The global warming about which there has been so much panic is based largely on completely unproven so-called evidence. One can look over records of the last century and see the average temperature of our atmosphere rising and falling with sunspot activity. And it's doing that today.

There is very little correlation with the variation of man-made carbon dioxide in the atmosphere. Yet it's the greenhouse gases that have been used as an excuse for punishing industry. Only a little of the carbon dioxide that goes into the atmosphere is man-made. Most of it is natural, but we've been told that coal-fired power stations are ruining the planet. Close all the coal-fired power stations tomorrow and the effect on the world economy would be absolutely catastrophic. The effect on atmospheric temperatures would be very small.

But we're starting to fight back. Clearly, we must be vigilant about potential environmental pollution. A great deal of damage has been caused by ignorance and a lack of such vigilance in the past. However, we have now been bombarded by scare tactics to the extent that we have gone to the other extreme.

Swent: The extra billions of people are producing a lot of the problem also.

McPherson: That's right, and those increasing populations require more energy, and they require more foodstuffs. Also, the general expectation of people is for an increasing standard of living. That standard varies tremendously, from country to country, but whether it is an individual or a nation, a striving for improved standards of living will require yet more raw materials and energy. Therefore, we're going to require, increasingly, the products of the crust of the earth. I'm preaching to the converted here, I know. But you prompted that tirade by asking what is going to bring students back in.

Swent: There's going to be a shortage of mining personnel one of these days, isn't there?

McPherson: Oh, it's already happening. A little while back we chatted about the tremendous growth of mining schools in the '70s and how they over-expanded. This had repercussions in the '80s when there were people being laid off and a lot of people were put on the market. That scene of the early '70s is being repeated now. Where, thank goodness, from a university professor's point of view, we have companies now coming to us looking for graduates in mining. And we've had an encouraging increase in recruitment this last year.

The coal-mining-oriented schools of the East learned their lesson very well, and instead of responding to the industry now in the same way they did in the '70s, instead of going crazy and putting on new faculty and having literally hundreds of students, they are rationing themselves. This is true in Virginia, and some of the other coal-mining schools. They're saying, "We're going to have no more than twenty-five to thirty students per year." But student quality will increase as they get more applications. They might get into some arguments with the industry over this. Some universities may be charged with under-producing, as far as the industry is concerned, for a few years. But nobody wants to repeat what happened before.

Swent: But they will have jobs.

McPherson: They will have jobs. I think the future is really good. The whole industry will go on being cyclic, the major part of it. There's no question about that. The very nature of the mining industry as the producer of raw materials will continue to ensure that it fluctuates up and down with national and international economies. But certainly through the rest of the '90s and into the next century I see a very bright future for young people going into mining. The best time to go in is when it's tough. Because then you've had a few years experience before the next take-off. Of the people who graduated with us through the '80s, some of them didn't stay in mining, but those that did will progress very well.

One of them is with Homestake up at Lead. His name is Jay Bowden. He graduated three, four years ago, not long ago, and had a year up at the McLaughlin Mine. He had spent a couple of summer vacations up there earlier. After a year at McLaughlin they sent him up to Lead and he's now the chief mining engineer. A very young man with relatively few years of experience, but he's a good fellow. We're going to see rapid promotions like that for the few people that have been produced from the country's mining schools during the '80s.

30. A NEW EMPHASIS FOR THE DEPARTMENT AT BERKELEY 1989-1991

McPherson: Anyway, another thing that was relevant to mining at Berkeley was that two, or maybe three, years ago, the department undertook one of its decennial ten-year plans. Actually it was a bit premature because I was involved in one just after I got here in '81. A committee was formulated external to the department to oversee this more recent academic plan and, to my mind, it was heavily weighted towards the expansion of materials science in the university.

There is no doubt that materials science is a current growth area and it was felt that we could do better in this area at Berkeley than we have been doing in recent years. So the emphasis on that was built into the committee. The need for regrouping in materials science at Berkeley seemed so clear that the mineral engineering faculty were persuaded to take a back seat. There were powerful voices on that committee promoting the expansion of materials science but really no forceful voice for mining or mineral engineering. The result of that has been that the materials science faculty is going to expand with new positions, and that makes sense in the current climate. I'm all for that. The negative side of it is that there are going to be no new positions in mineral engineering. It was made clear that there is no chance of additional mining faculty and certainly not to the critical mass of five required for a quality mining program.

Swent: The title is still going to be Materials Science and Mineral Engineering--are they keeping it the same?

McPherson: Who knows. It's likely the name of the department will change to reflect the new emphasis but I don't know about that.

Swent: So Mike Hood will be carrying the load alone.

McPherson: So we've been running with two people trying to hold the mining program together, far short of the critical mass necessary.

31. THE VIRGINIA CONNECTION, 1991

McPherson: In the meantime, VPI [Virginia Polytechnic Institute and State University] and a number of other places had been in contact with me, and I began to get restless again. I had been approached a number of times with job opportunities by various universities throughout the decade. One of these was to take over as head of department at my alma mater in Nottingham. It was very tempting to step into Hinsley's old shoes. But I turned down all these jobs. My family were here in California, it's a nice place to live, so I really wasn't interested.

But then the people at VPI contacted me again. I knew the head of the department there very well, a fellow called Michael Karmis. He is a graduate of Strathclyde University in Glasgow, Scotland, and I've known him for a long while. He telephoned and said, "Why don't you come over, Malcolm? Bring Shirley and have a few days with us?" So we went across in the spring, 1991. Shirley loved the countryside. It is very like the areas of Derbyshire and Nottingham which Shirley had come from, the four seasons, the same sort of rolling countryside, sheep and cows and bubbling brooks and so on. I talked to all of the faculty at VPI. I still wasn't really serious about it. I talked to the dean of engineering, Wayne Clough, a Berkeley graduate; also Mike Duncan, who had moved from the Berkeley faculty to VPI, and towards the end of those few days they said, "We would really like to get you across here, Malcolm."

And still not really taking it too seriously, I intimated a number of requests which were somewhat demanding, including an endowed chair. I came back home and thought that was it, but shortly afterwards I had a call and a follow-up letter from Karmis saying, "Sure, we can reach agreement, please come." And I really couldn't say no after that. I still didn't say yes, actually, for quite some time.

I went back East again, talked to people in coal mining companies and the Bureau of Mines to get their feelings on the future of that particular school and the quality of research. It was, and is, also the lead university for what they call a generic center for mining systems research. This is the way the U. S. Bureau of Mines allocates research monies to universities for mining and other associated fields. For example, there's one in comminution and one in respirable dust. VPI is the lead university for ground control and mining systems. Part of the package they offered me was to take over the directorship of this major research center as well. So when you put all of this together--

Swent: An offer you couldn't refuse.

McPherson: It was one of those offers that I couldn't say no to. I'm going to be very sorry to leave Berkeley in many ways. I've made lots of friends here. Shirley and I went through the exercise, yet again, of writing down the pros and cons on a piece of paper. The hardest thing, the most difficult part of this is leaving students who are in progress here. I've got a tremendous conscience about this. Perhaps it's one of those psychological things that comes from my background of working in the mines and having such dependence on each other. To me, loyalty to one's colleagues is so important. Disloyalty is something I've never been able to understand. I just can't comprehend it.

So leaving students here is the biggest drawback for me. And I've talked to them individually. One of my graduate students is coming with me and the others are graduating at the right time, thank goodness. I have also talked to the undergraduates about it and they've all been very understanding. They've said, "Yes, you're doing the right thing. We'll be okay." So they've made it a little bit easier to make my move. So on January 1, 1992, I officially start at VPI. So I guess that's about the end of my story.

Swent: And Mike will have to carry on alone?

McPherson: Well, I think the college here is going to have to make its mind up whether it wants a mining or a mineral engineering program at undergraduate level. What has largely happened during these last few years is that things have reverted to where they were in '81, before everyone came together as a team. The program has struggled to survive the difficulties that we've talked about, like inadequate funding, like poor recruitment. But the faculty tend to be doing their own thing now. They have their own little corners.

Swent: How many undergraduate mining students are there now?

McPherson: About twenty-five, and that includes twelve freshmen that shot up in this last year. And that's a good sign. But, as I say, the college is going to have to make its mind up whether it wants a mining or a mineral engineering undergraduate program. If it does, and if it is serious about it, then the two things that we needed at the beginning of the decade have got to happen. One, we've got to get the students in, and the signs are that this is now happening again, and two, they've got to put on sufficient faculty to encompass the mining disciplines. If they don't do those two things then it will continue to struggle and it would be sensible to cut it. Either do it well or don't do it at all.

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Swent: You hope that with the resurgence of interest, they will strengthen the program.

McPherson: Yes, this is the decision that the college has to make and I hope that they decide that the mining industry is sufficiently important in California to merit one mining school in the state university system.

And it is a big industry in California. Very few underground mines but lots of surface mines, some of them with not very exciting minerals; about half of the Californian mining industry is industrial minerals. The efforts that Mike [Hood] and I have made over these past few years have increasingly been aimed toward the Californian mining industry itself. That's been an uphill battle because as they have required more people in recent years, rather than coming to Berkeley for graduates they've gone to the Mackay School of Mines in Reno, they've gone to South Dakota, they've even gone to Montana.

This is partly because there was no mining program here between '62 and '78. People in those companies come from other schools, and they go back to their own schools for recruits. Other arguments that Mike and I have heard is that those are the kind of graduates they require, rather than research oriented people that are perceived coming from Berkeley. This is the kind of thing we've been fighting against despite the fact that young guys like Jay Bowden are doing a great job for us, going out there and showing that Berkeley people are first class. So, hopefully, the university here will realize that, take advantage of it, and reinforce the mining program rather than let it atrophy.

There is another thing that works against us in mining at Berkeley. Mining is quite widespread in California; the value of raw mine products is about $3 billion per year. This sounds considerable but is still a very small part of the state gross annual product. So mining, although an important industry on which all other sectors of the economy depend, is not in itself a large economic force in the state. The products that are produced from it, of course, increase in value by about an order of magnitude through each stage of processing. But the actual process of getting the minerals out of the ground is small business compared with the activities of the total state.

Whereas in the Virginias, Kentucky, and Alabama, for example, mining is a very large part of the state annual product. Forty-six percent of the economy in Virginia is coal mining. So, this, I think is an explanation of why those departments have such great support politically as well as from the mining companies. They have a tremendous leverage. In terms of numbers of students, they are smaller than law or medicine, or civil, mechanical and electrical engineering, but in terms of influence within the university, they're very powerful. My appointment at VPI is an indication of that. Virginia is going through a budget crisis just like California at the present time. They have a moratorium on new appointments in Virginia, and yet, despite that, they were able to appoint me at a senior level.

Swent: Are you replacing someone else?

McPherson: No.

Swent: This is a new appointment?

McPherson: Yes; the only reason I bring this up is an indication of the tremendous influence they have. We don't have that in the mining group at Berkeley. We're pretty small fry. And this is a great disadvantage.

Swent: Well, it sounds like a very exciting move.

McPherson: Well, I guess it starts another ten years for Shirley and me. I've got some ideas of some things I'd like to do. The funding is there, the people are there.

Swent: And you'll still be coming back here for your company and your family and so on?

McPherson: Oh yes, I'm sure. As I say, we've already opened up a company office in Virginia. I can see that expanding quite rapidly.

Swent: Do you plan to keep your headquarters here? Or move it back there?

McPherson: Well, it's going to stay here in the meantime. We'll close the Lafayette office. It doesn't make sense to have two in California so we'll have one in Fresno and expand the one, hopefully, in Virginia. And keep our international work going as well.

Swent: Well, I guess that covers up to date then.

McPherson: I guess so.

Swent: Thank you very, very much. It was very good of you to squeeze this into your crowded schedule.

32. EPILOGUE

McPherson: Looking back as a kind of epilogue, Lee, one might say that my career in mining was proscribed because of my background, the family background. Certainly the move into academia and research was not proscribed in that way because it was a very practically oriented mining family that I came from. Working your way through in the mines and maybe getting to be a colliery manager was the way to go. My moving into academia was something I think my father found difficult to understand.

Swent: I was thinking how proud they must be. They lived to see some of this?

McPherson: My father died in '71, my mother died in '75.

Swent: Before you came here then.

McPherson: Oh, in addition to our problems with apartheid, one of the reasons we did not settle in South Africa was because all four parents were still alive, although not too well at that time. And Shirley and I promised each other that we would never leave the country while any of them were still alive, and we didn't. The old loyalty thing again.

Swent: But your brother is still alive. He must be very pleased with what you've done.

McPherson: Oh, very much so. Yes, it's fun to go back every two or three years and spend some time with our families. It's nice to go back. However, what I was going to say, looking back on my career, was that towards the end of his book Jim commented, that if he had a son, he would not advise him to go into mining because it was a hard life. And in terms of mine production and working in the mines, that's true.

I've had it fairly easy from that point of view being an academic and a consultant. I've had a fairly exciting life. Tramping around the world, doing different things, facing new challenges and making things work, meeting people in all kinds of countries. Looking back, I think I would say the same thing to my son. In fact, I have done just that. I would not like to see him be a miner, or work every day in the mine. The sort of work I do, yes, it's great and it's exciting. In my career there are a few things I would have changed. People make mistakes and not all of my decisions were good ones, but, in general, I don't think I would have changed anything major. It's been a very satisfying life.

Swent: What is your son doing?

McPherson: He's in construction. And he's living quite close to us.

Swent: His work is a little related to yours then?

McPherson: Yes, a little bit. He's actually been talking, long before this VPI thing came up, about going to the East. His wife comes from New Jersey, so they have been talking about going back there. So it might happen. They might move across in a year or two.

Swent: But it has been a good life.

McPherson: I've enjoyed it. It's been a lot of fun. As I said, I've made some mistakes. I think my main regret was one I mentioned before and that was missing out on seeing my kids growing up to a large extent. When they were having their vacations from school during the summer I was usually under the ground in some other country. I think maybe if I could change anything it would be that.

Swent: But you can't have it both ways.

McPherson: No. I guess when you're young, you get excited by a little bit of success and it's kind of an ego trip as well. You get invited to go to some distant place to do a job and you think, "Oh great, why are you asking me? I'd love to go." But that doesn't last very long. That kind of feeling really doesn't last very long. I think that by the late '70s, I was ready to settle down.

Swent: Well, you've been very good to share all of this.

McPherson: Well, thank you, Lee, for listening to my ramblings.

Maybe it is the nostalgia of the moment but it has just struck me that one deeper reason for my move to Virginia might be that my roots in coal mining have finally proved to be an irresistible pull and I am succumbing to it. But, who knows what the last ten years of my career will bring.

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Western Mining in the Twentieth Century Series

James McPherson

DEVELOPMENT OF LONGWALL MINING IN THE UNITED KINGDOM, 1940-1985

Interviews Conducted by
Malcolm McPherson
in 1990

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INTRODUCTION

It was one of the darkest winters in the history of Great Britain. Six months after the start of World War II, Hitler's tanks had rolled victoriously across the countries of Europe. Britain stood alone but defiant in 1940, opposing the seemingly unstoppable German juggernaut. On a cold Monday morning early in that year, a fourteen year old boy reported for work at a colliery in the small coalmining town of Larkhall in Scotland. It was the beginning of the career of a mining engineer, my brother Jim McPherson.

However, the real background to this story lies much earlier in the aftermath of the Jacobite rebellion that terminated with the defeat of Prince Charles Stuart's army of Scottish highlanders on Culloden field in 1745. This was the last land battle to be fought on British soil and was followed by clearances of the people from the Scottish Highlands - first by the gun and sword, then by brutal evictions, house burnings and forced emigration. Many of the families departed to faraway countries, in particular Australia, Canada and the United States of America. Economic deprivation in the Highlands maintained the human outflow from Scotland for some two hundred years.

Some of the highland families moved south throughout the nineteenth century and found work in the increasingly industrialised lowlands of Scotland. Two such families were the McPhersons and the McLachlans. James McPherson and his wife Mary Fleming had twelve offspring around the turn of the century. One of those children, Malcolm McPherson, was born on June 24, 1901. Jeannie McLachlan saw her first light of day on June 17, 1904, one of eight children born to James McLachlan and his wife Jean Robertson. Despite the size of those families, few of their progeny remain in Scotland today.

Malcolm and Jeannie were married on New Year's Day, 1922. They, in turn, had four children, Jean, Mary, James (Jim) and myself. Jean died of pneumonia when she was fourteen, just three weeks before I was born. Relatives on both sides of the family were dependent for their livelihoods on the coal mining industry of Scotland. Malcolm, however, was a little different to his peers. Not content to remain a coal miner, he aspired to a management role in the mines, an ambition that was neither easy to attain nor popular at the time. This was the family setting in that winter of 1939-'40 when young Jim started work at the mine in Larkhall.

In 1943 while the war was seemingly endless, Malcolm, Jeannie and their three remaining children moved yet further south to the coalfields of central England. In the years that followed, Jim interlaced work as a miner with part-time studies and obtained his colliery manager's certificate. Rapid promotion in the coalfields of Derbyshire and Leicestershire saw him becoming manager of some of the largest mines in those areas. From 1970 until his retirement in 1985 he was Area Production Manager in charge of mining operations for the complete Leicestershire coalfield.

Jim's career spanned the evolution of mechanization in the longwall method of coal mining - from rudimentary coal cutters and shaker pan conveyors to the highly automated and integrated mining systems of the 1980's. The development of longwall mining and the machines that made it possible were a driving force in Jim's career and provide a central theme throughout this book.

Jim now lives in retirement in Hugglescote, near the town of Coalville, Leicestershire, residing in the same house that he occupied during much of his time as a senior official of the National Coal Board. His wife Iris, and their youngest daughter, Heather, own and operate a thriving small business in Coalville, specialising in antique jewelry. Daughter Jane also lives nearbye while the middle of the three sisters, Sheena, lives in Anglesey, Wales.

Our sister, Mary, and her husband, Norman, live near Derby with their family nearbye. I followed the sad Scottish tradition of emigration and, in 1981, moved with my wife Shirley to California. Our two children are also settled in America.

Shirley and I cannot allow more than about two years between visits to our home country. During such a trip in August, 1990, and while staying at his home, I persuaded Jim to talk about his career over a series of taped interviews. Those tapes formed the basis of his oral history.

This, then, is the story of my brother, Jim.

Malcolm J. McPherson
Lafayette, California
May, 1991

ACKNOWLEDGEMENT

My secretary at Mine Ventilation Services, Inc., Lucy Musante, performed miracles in transcribing strange accents and foreign terminology from tapes of dubious quality to the first draft. Her patience persevered through four further drafts to produce this final version. We are most grateful for her skill and forbearance.

A copy of this book has been lodged for future students of industrial history in the archives of the Oral History Department, Bancroft Library, University of California, Berkeley, CA, 94720, U.S.A.

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University of California
Berkeley, California 94720

BIOGRAPHICAL INFORMATION

(Please write clearly. Use black ink.)

Your full name James McPherson

Date of birth March 29, 1926 Birthplace Fernegair, Scotland

Father's full name Malcolm McPherson

Occupation Colliery Undermanager Birthplace Larkhall, Lanarkshire, Scotlan

Mother's full name Jeannie McPherson (nee McLachlan)

Occupation Homemaker Birthplace Larkhall, Scotland.

Your spouse Iris McPherson (nee Radford)

Your children Jane (1948), Sheena (1954), Heather (1954)

Where did you grow up? Larkhall, Lanrkshire, Scotland, and Ripley, Derbyshire, Englan

Present community Hugglescote, Coalville, Leicestershire, England.

Education Larkhall Academy, Scotland (Highschool): Heanor Mining and Technical Colle
Derbyshire, England.

Occupation(s) Mining Engineer

Areas of expertise Coal mining, Mine management.

Other interests or activities Golf. Gardening. Antique paintings.

Organizations in which you are active Institution of Mining Engineers, England.
Willersley Golf Club, Ashby, Leics, England (President 1991 to 1993)

1. EARLY DAYS IN SCOTLAND, 1926-1943

Q. (Malcolm McPherson) This is a bit unusual, you know, having one brother interviewing another.

A. (Jim McPherson) I suppose it is.

Q. We are likely to get some of the family names mixed in with our conversation. But that's O.K., it will add a bit of human interest. Probably the first thing that would be helpful is to get ourselves organized into time periods. These could follow the stages of your career from your early days in Scotland and then moving to England during the war.

A. Not just in particular the development of longwall mining. It could involve other aspects as well.

Q. I would like to keep the development of longwall mining as the central theme.

A. But anything else that is relevant to that, you want to know from my experience.

Q. Yes, right. Then perhaps as the second stage, the time of your education and training after coming to England, and then take it through your days of colliery undermanager and manager - does that sound like a reasonable way of organizing it?

A. Yes, that sounds all right.

Q. O.K. Let's start at the beginning. You were born in 1926?

A. March 1926. 29th March 1926 to be precise.

Q. And that was a year of great controversy in the mining industry of the United Kingdom.

A. Yes, that was during the famous miners' strike of 1926 which developed into a general strike all over the country.

Q. Where were you born?

A. I was born in a little place called Twechar, in Kilsyth not far from Stirling, Scotland.

Q. Do you remember anything about that, how old were you when you left Twechar?

A. None at all, I can't even remember Twechar. The farthest back that I can remember was a little place called Fernegair, and I think one of the reasons why I remember that is because that's where I was severely burned - I set fire to myself with a box of matches when I was probably only 3 or 4 years of age.

Q. You can remember that?

A. I can remember going to the hospital with a man with a peaked cap on.

Q. In an ambulance?

A. No, I think it was a taxi, or so our father told me, but that's the first thing I can remember in my life. I must have been about 3 or 4, possibly 3, and I was severely burned. I was dumb till I was about 5 or 6. I couldn't speak at all. The doctors said it was shock. When I started to speak I had an awful stammer. I've still got a little bit now. Over the years it diminished but I had trouble in my school days with the stammer. I had the Scottish and McPherson tenacity and I got over it. I used to get into loads of fights over it at school.

Q. Was it in Fernegair you started school?

A. No, I started school in a place called the Marlage which is outside Larkhall in Lanarkshire. The name of the school was Dalserf. In fact I've been back since. It's all closed down now and boarded up. I vividly remember that.

Q. How old were you when you changed from that school to the next one?

A. We moved to Larkhall from there because our father was working at the local mine near the Marlage, where you were born Malcolm. I well remember your birth, Malcolm. It was in a row of miners' cottages - 6 in all. The beds were recesses in the wall, with wooden boards, no springs. You were born in the back room and I remember your first cry. We had no electricity, paraffin lamps for lighting.

The mine was called Woodside Colliery and it got into financial difficulties - it was in private enterprise days and our father was a coal cutter operator but he also had his deputy's certificate as well. He was offered a deputy's job at Skellyton Colliery in Larkhall, and that's when we moved to Drygate Street, #78 Drygate Street, next door to Granny and Grandpa McLachlan. I went originally to Machinhill Junior School, which was about 2 miles from Drygate Street. We had to pass a special exam, not unlike the 11 plus as it is now, and I found myself, when I was 11, at Larkhall Academy.

Q. And that would be similar to High School now?

A. Yes, you could either go into what was termed the lower grade or you could go into the higher grade. The higher grade involved arts subjects and I didn't want that. I opted for the science subjects, woodworking and mechanics. I didn't want to study French and Latin and German. That had no interest for me whatsoever.

Q. So the sciences were regarded as second grade?

A. That's right. From the arts side of the academy you go on further, but the other way you had an option to leave at 14 years of age or go on until you were 16 and take the day school certificate lower, whereas the art side of it took the day school certificate higher, which meant they could go on from there to further education.

Q. They were a higher form of life than you were.

A. They were a higher form of life than what I would call the workers, the rough ones. That's about it.

Q. And were the two streams fairly evenly divided in numbers?

A. Yes, fairly, but there was a great animosity between them. They used to fight like cat and dog. It was a boys' school and we used to have our own little bits of the playground. Every so often we used to raid each other and take over - up steps to their place and up steps to our place. I can vividly remember that but it was all in good fun, I think. There was nothing vicious about it. It was just one of those things that sometimes we were top dogs and sometimes they were top dogs. So the mechanics of the school were the lower ones, which I was part of. We thought the upper ones were a bit toffee-nosed and we didn't like them very much. So there was great rivalry.

Q. What was the influence on you there that made you want to go for the more scientifically oriented subjects rather than the arts and classics? Was it the home background?

A. Yes, I think it was because of our father and all the family - our uncles. Our father and our uncles were all in mining and our mother didn't want me to go into mining at all. In fact, when I was coming up to 14 years of age I wanted to go to the pit and she said I couldn't. She sent me for an interview and for a little written examination to go into the co-op of all things. Larkhall Cooperative Society; and I went with the view that I wasn't going to pass this. I didn't want the job there, and of course the word came through that I was totally unsuitable for the Larkhall Cooperative. My father, who was working then at Skellyton Colliery got me a job. I think I was 14 on the Thursday or Friday and I started at Skellyton Colliery on the surface on the Monday.

Q. So you were 14 when you left school?

A. I was 14 when I left school - that's right. And I started on the surface. But before that - here's another interesting point as well - we weren't very well off. In fact our elder sister died when she was 13 or 14 in the Marlage - Jean. I can remember this very vividly - I can remember feeling it was terrible because our father was really upset. In fact he tried to drag the little white coffin out of the grave. We all stood with the cords in our hands - all the family. Women were not allowed to go to the graveside in those days, in Scotland, only the men. All the women stayed at home and I had a cord next to our dad and our uncles.

Q. This was about the same time you left school - about when you were 14?

A. I was 10 or 11, just before we left the Marlage. I'm not sure. Yes, it must have been then. We left the Marlage very soon after that.

Q. Jean died just a few weeks before I was born, so you must have been 11 or 12.

A. That's right, 11. I was 11, I was just ready for leaving. 11 when I went to Machinhill and I was there in Machinhill just a few months, that's all, before I took the examination to go to the academy. I was 11 or 12 when I went to the academy. I was about 2 years there, that's right. And as I said, I can very vividly remember we had to lower this little white coffin into the grave at Larkhall cemetery and we all had to drop our cords in one by one from the ten cords and I remember looking at dad and tears were rolling down his face and I dropped my cord in and he got his cord and tried to drag the coffin out of the grave. That vividly sticks in my mind.

Again, coming back to when I left school, just before then, as I said, we were so poor, in the summer holidays I used to go and pick raspberries on Clydeside. I used to get up about 6:00 in the morning, catch the bus from Larkhall up to the top of what was called the Harelees

Brae, and I'd walk then about 2 miles (it seemed a long, long way) right down to Clydeside. We worked from 7:00 in the morning till 5:00 at night. I think for a shilling a day. That's right, I got 5 shillings in a week and I brought that home and I think I got six pence from our mother, spending money. I thought it was a fortune. You had to do it because that's how we were. You know there was no social security like there is today. Our father was in hospital during this time. I think he had ulcers or a rupture. And of course Mary and you were there and that was it. I just supplemented the income.

Q. Looking back on it now, do you think that your decision to go into mining was so dominated by the family background that you really had no choice?

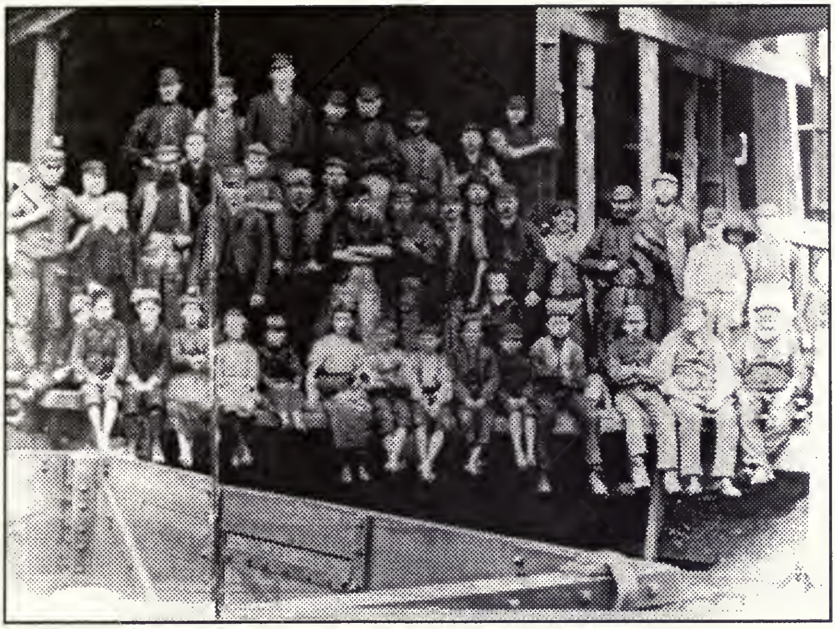
A. Yes, I think that's true. Once I failed the examination on purpose at Larkhall Coop, I had no other choice. And I wanted to go into mining anyhow. That's what I was brought up in, that's what I saw all my life and it was all the talk between our uncles, and dad - and I wanted to go into mining, it was a family affair.

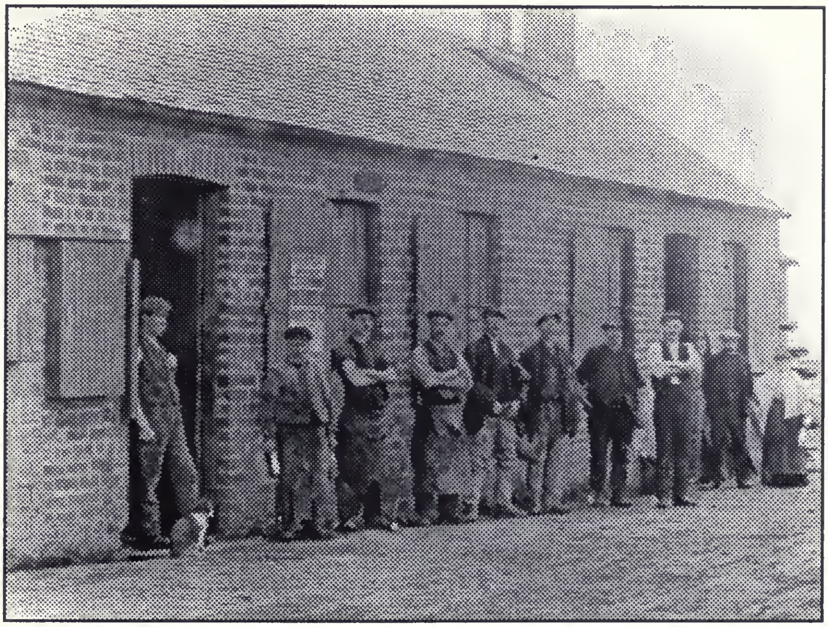
Q. And both grandfathers had worked at local mines.

A. Both grandfathers - Grandfather McPherson was a miner at Birkenshaw Colliery and he got his leg broken when he was, I think, up towards 60 and he never worked again. Our grandfather on mother's side was a colliery blacksmith. He was chief blacksmith in the Boag Colliery just outside Larkhall and he retired early as well because he had leg trouble, they said. In fact he could hardly walk in the end. They said it was because he was standing over the forge, with the cold draughts coming in. This was the story. Whether it was true or not I don't know but I suffer a bit from it myself now but not nearly as bad as he was. He could only walk with two sticks - you can remember that Malcolm? Him sitting up in his big chair in the kitchen smoking his pipe against the stove. And when he used to shake your hand he almost broke it. The strong grip of a blacksmith. And our uncles on our mother's side - some of them were blacksmiths - John was - but Guy and Dan - they were in mining. They were at Skellyton Colliery until Dan left. He was a good football player - and a bagpipe player. He went to Corby to work at Stewarts and Lloyds Steel Works and to play football for Corby Town.

Our uncles on our father's side - Tam, Bill, Dougie and Sammy were all in mining. Jim, the eldest, was killed during the 1914-18 War and Duncan died early. I never knew Jim or Duncan. Our father told me that he saw Jim on his last leave before he went to France. He was dressed in his kilt, the "Seaforth Highlanders." He stood with his back to the fire and lifted up his kilt to warm his bottom. He was killed at the battle of the Somme shortly after.

So again, I started on the surface at Skellyton Colliery picking stones off a steel table - picking, as it was termed. The tubs came up the shaft, went into a turntable, they tipped on to a screen (a shaker screen). It was all pulleys and belts driven by d.c. current generated at the colliery through Lancashire boilers. My job was to pick all the stones out from the coal. Sometimes you got a tub that came down full of stone and it clogged everything, and we had to stop it. It was a very arduous job, your hands got sore. And then I used to shovel coal out of wagons into the hoppers for the Lancashire boilers. After 6 months of this someone let





Above: a group of coal miners and their children. Taken at a coal mine in Larkhall, Lanarkshire, Scotland. Circa 1910.

Below: Grandad James McLachlan's "smiddy" (blacksmith's shop) at the coal mine in Larkhall, Lanarkshire, Scotland. Grandad McLachlan is standing in the doorway.

a tub run away down into the boiler house and I had my foot injured. Our father said I wasn't being looked after properly. I think I wasn't quite 15, or just 15, I think it was 15 before you could go underground, that is when I went to work down the pit. In those days you were never allowed to ride the cage with any of your relatives, either your uncles or your father, in case anything happened in the shaft. That was the law. That was laid down. So when I first descended, Uncle Guy met me at the bottom of the shaft.

Q. So were shaft accidents quite common?

A. Quite common, yes. Breaks in the guides, cages stuck in the shaft. There were no rope guides. It was all rigid wooden guides fastened on to the side of the shaft with buntons. There were slippers on the side of the cage and they used to put grease on to make them slip on the guides. Sometimes a bolt came out and the cage slid across and got stuck. There were no rope guides then, it was all fixed wooden guides in the shaft. I can remember some men being stuck in the shaft for hours. We had to get a winch and go down and get them out.

Q. That must have been terrifying.

A. Yes, but that's how it was.

Q. What sort of lighting did you have, cap lamps?

A. They had just had a big explosion. It was a naked light mine, but when I started down the pit they had safety lamps. There had been a big explosion when the manager and a deputy were killed. It was fairly high in methane as I recall now. I can tell some stories about the Station pit. When I say Station pit, that's what it was called because it was near the Station, but the original name was Skellyton Colliery. Why it was called Skellyton I don't know but its local name was always the Station. So, I went underground and I was taken in by my Uncle Guy into this district. My first job was pushing trams (tubs), and the trams were not very big - they were wooden trams, wooden sides on a steel frame. They only held about 7 or 8 hundred weights. And the reason, again, they were so small was because of the size of the roadways. Everywhere you went, you had to stoop.

Q. You couldn't walk upright?

A. No, only at junctions, or where they had put in a rope haulage. It was all main and tail haulage on the level and direct rope haulages on the inclines, that was the method of haulage. Inbye it was all pony haulage which I'll explain when I come on to the start of the longwall system. So, as I say, my first job was when they brought in these 14 tubs as a train on the main and tail haulage, we used to split them up into two 5's and a 4 because it was the bottom of an incline. I used to uncouple these and push them forward. There was a bypass at the bottom - they'd drop down five full ones and I took the rope off those and put it on the five empty ones and rang it away with a pull wire. I can tell you a funny story about the pull wire. Our dad nearly tore the shirt off my back.

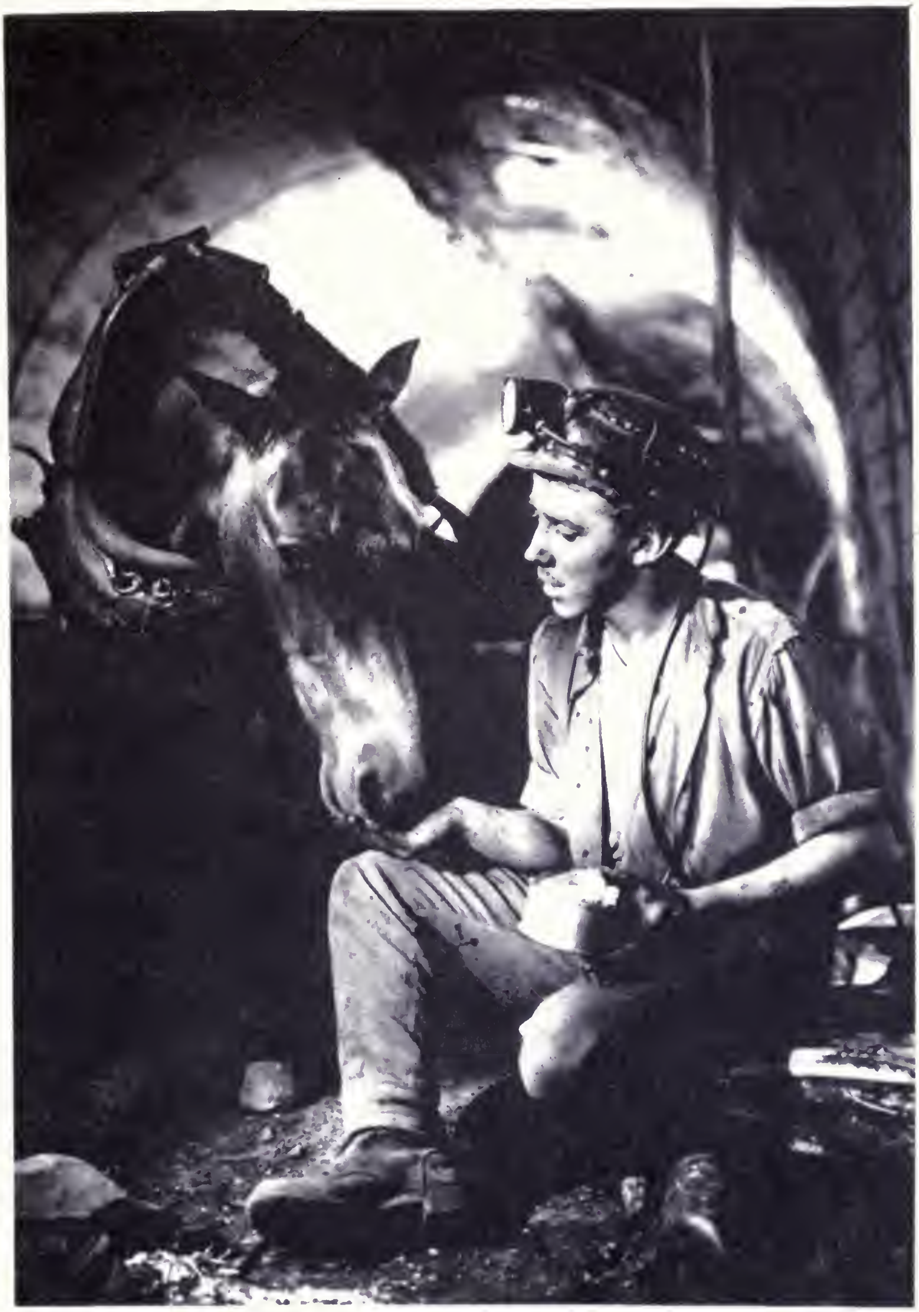
Q. What had you done that was so wrong?

A. At the junction at the bottom of the incline, the incline was about 150 meters at 1 in 4 to the rise, there was a bell rope - it was a solid wire rope that you pulled on. At the top of the incline next to the haulage engine was a pulley with big weights on, and as you pulled the wire rope you lifted up these weights and a clanger rang on a bell. It sounded as you let go for one and two and three and that was the signal to haul away. Anyhow, the bell rope was at the other side of the junction so each time I had to walk about 5 or 6 yards up the drift to get hold of the bell wire to ring it away. So I got the idea that if I got a bit of bell wire, made a loop and hooked it on to the other one, took the weights off the clanger at the top, then I could extend the wire, straight across the junction, tie it on there and I wouldn't have to walk all the way up the damned incline every so often; and this I did. What I forgot was what happened when you took the tension off the bell wire going up the incline and over the pulley with weights on - even though we spragged the weights up - the chap at the top said, "That's a good idea, we'll do it." I forgot I couldn't get enough tension from the new rope I was putting on across the junction, so as soon as I did that and then released the fastener from where it was, all the weights dropped on the floor. We had no tension and the bell wire was sagging all the way up the incline. So there were no signals. Our father was the Overman in the district and of course they ran out of empty tubs, there were no tubs coming in. I'll always remember his face. He came and said, "What's the matter?" I said, "it's the bell wire." He says, "What have you done?" I said, "I've tried to extend it" and he went "ahhh" and he got hold of my shirt and ripped it - really ripped it. I started crying and our Uncle Guy came along and that was the end of it. They had to get a winch to tension the wire rope and it knocked the district off for about an hour and a half. It was private enterprise in those days and our dad could have had the sack, and me.

Q. What was your next job after that?

A. The next job after that was pony driving. As I came down the shaft one morning the deputy said, "Can you drive a pony, Jimmy?" and I said, "Of course I can." I had never driven one in my life. He said, "Well, go up to where them lights are, this is the pit bottom and there were some lights in the pit bottom, just keep walking about 200 yards and you'll come to the stables and tell the Ostler to give you a nice quiet horse." You know, a little one. They were mostly Shetland ponies with great strong necks, but the reason we had to have Shetland ponies was because, again, the size of the roadways on the semi longwall system. I went up and told the Ostler to get me (he was a big fat chap - a great big belly) a quiet horse and he said, "I'll give you Major, he's the quietest horse in the stable. Do you know how to put the girth on him?" The girth was the harness. I said, "No." He said, "Come on, I'll show you once." So he took me and showed me and he said, "When you come back you've got to make certain the horse is all brushed down and cleaned all the mud off it because it's a bit wet sometimes, wash it and everything else and brush the harness and hang it up again, and feed it." And he showed me how to put the harness on. And he says, "And you'll want a nose bag." So he got a nose bag and that went over the horse's head. And he says, "Where are you going?" I says, "Up there." And he says, "Well, when you get to the pit bottom, just get hold of the horse's tail, he might go by himself and if he doesn't feel like it you'll have to lead him." And this is exactly what happened, the horse took me. And so off I set. And that was my first view of what I would term the stalls of the semi longwall system.

Q. And the ponies were used for transporting the coal?



The last of the pit ponies, taken at Nailstone Colliery, circa 1950.

A. The ponies were used from the main laterals, which I'll explain in a second, up into the stall end. And as I have said, they were Shetland ponies because of the height. The roads were only about 6 by 6 feet, and even less than that in places. Now coming back to the system of working at the coal face. We used to have the so-called room and pillar that you have in the States now, I understand fairly extensively. I saw a little bit of it and I think the main reason why it was discontinued, well, there are two reasons really. First of all, it was wasting coal because we didn't take the pillars out. We hadn't any supports - no roof bolts in those days. And the second and most important reason was because of ventilation, there was hardly any air at all. I think that before my days, the ventilation was by furnace at the bottom of the shaft. You can explain it better than I can, Malcolm. But the ventilation, I can always remember, it was a great big fan on the surface. It was a Waddel fan, a huge thing, a huge iron structure, and it turned slowly, a centrifugal fan. It was very inefficient. So that was one of the main reasons why they had to look for a different system of mining. I think so anyhow. And so we come on to the stall system because they had not then developed face conveyors. Two laterals were driven, the intake and the return. And from the laterals they drove other roads, secondary roads off that up to the coal face. And then from there they put on little branch roads like a herring bone effect, a feathering effect. Each stall comprised of one man, and a boy who was 16 and over, who filled the tubs at the road end on a steel plate. And I think there was only about 4 to 5 meters either side of each road, that was his stall, and he used to get the coal and cast it onto the road head. Then the lad used to fill the tub and in comes the pony driver with one single tub. Every so often we used to widen the roadway a little bit so we could side tip the empty tub while we brought the full one back. It used to always rub the wheels coming by, I can remember that. And that's how it was. The tubs were hauled down on to the main lateral where there were larger horses, and they hauled in 5 and 6's out again into the main direct haulage up or down the inclines to the main and tail haulage to the pit bottom. So that was virtually the start of the longwall mining away from the room and pillar.

Q. So it was a series of stalls, not in a straight line.

A. They were formed in a semi circle. I don't know why, whether it was because of the cleat or roof control. Sometimes they were the other way, and it was like a sort of branching out all the time. And I would think the whole lot in total would probably be about 10 or 12 stalls. So we're not talking about a great distance. When that area was worked out or got so far they couldn't ventilate it, then they came out and went a bit further down and did the same thing, and then they drove the lateral further.

Q. What was the method of breaking the coal down from the solid?

A. They used to drill with a hand drill, a ratchet drill, with a bar and a screw in it and a handle, one shot per stall, just to break in. You had to hammer and wedge the rest.

Q. Were coal cutters being used?

A. Coal cutters were being used, yes. It was the old Anderson Boyes coal cutters.

Q. Chain jib?

A. Chain jib, yes. That was of course just at the start of the war. Because I started at the mines in 1939-40. Just when war broke out.

Q. What was the distance of advance?

A. Jibs were about 3 foot 6, 4 feet at the most.

Q. I see, it was undercut to 3 foot 6. And the drills went in the same distance?

A. That's right. A little bit shorter than that. Not to the back of the coal.

Q. What sort of explosives were used?

A. It used to be with naked light, black powder, but once they brought in the safety lamps it was gelignite and a detonator.

Q. When did it become a safety lamp mine?

A. I think the explosion took place in 1938.

Q. So that was before you actually started in the mine.

A. That's right. There was a report came out about it. I've got it here somewhere.

Q. So was every coal mine individually rated then for whether it was a gassy mine in a legal sense or, when did it become that all coal mines were gassy in a legal sense?

A. That was at nationalization, in 1947.

Q. That was long afterwards?

A. Yes, in fact they had mines which had mixed lights. Some parts of the mine were naked light, and some parts - in seams, were safety lamps. That caused a lot of problems, having mixed lights. There was a part of Skellyton Colliery that was still naked light. There was one seam that was naked light - we called it the Virtuwell - it was steam coal but the lower and upper Dumgray seams, they had methane. And that's why they had safety lamps. And the safety lamps, they were heavy. They weighed a ton - well, they were very, very heavy. And they were not dry batteries, they had acid batteries.

Q. O.K., so when you say safety lamps, you're talking about electric lights.

A. That's right.

Q. And that was the main form of illumination once you got away into the faces?

A. Once you left the pit bottom. There were only fixed lights in the pit bottom.

Q. So the gauze lamp at that time was just used for measuring gas concentrations?

A. That's right. It was carbide lamps in the naked side of the mine. Shooky lamps they called them. And Ceag acid electric lamps, in the safety lamp side.

Q. They leaked acid?

A. They leaked acid. Used to burn your trousers.

Q. What was the method of support in the - let's talk about the faces and the roadways separately. What was the major method of roadway support?

A. Wood stretchers. It was a fairly hard sandstone. White sandstone. And we only set stretchers when we thought it was necessary. There was not much pressure.

Q. It was a shallow mine?

A. Yes. I can't remember the depth of the shafts.

Q. Were these set by colliers as they advanced the stalls?

A. No, the roadways were advanced, by what they called in Scotland, brushers. These were rippers in effect. We called them brushers, and they'd come along and they'd drill one hole, again, by hand, blast the roof down and pack the stone on the other side. That supported the roof behind the stall.

Q. How thick was the seam?

A. Three feet to 3 feet 6 inches.

Q. So the roadways had to be enlarged above the height of the seam.

A. That's right. About 6 feet high maximum.

Q. That's not usually done in the States.

A. Yes, because you've got thick seams. I can come on to the thicker seams later on. This is when I first started in mining.

Q. What about the face itself. Was that all just single timber props and bars.

A. Timber props. And lids, that is small pieces of wood over the top of the props. There were no bars.

Q. Were they set in a pattern? Or did the collier just set them there as they felt was necessary.

A. They were set straight. Like soldiers. I think there were support rules as such. Again, laid down by management. They were so far apart, I can't really recall, but they were certainly set in a line. But there were no bars.

Q. And were those props left in the waste area or were they drawn out?

A. They were chopped out with a hatchet by the people who put the little stone packs on either side of the roadway. They took them off as they put the stone packs on.

Q. O.K., let's organize it then into a 3 shift operation? It was coaling on one shift? Take us through it. What were the 3 shifts?

A. They coaled on the day shift, they ripped and packed on the afternoon shift and they cut the coal on the night shift.

Q. And the packing, was it just to the side of the roadways or did they have intermediate packs?

A. Well, the roadways were so close together, from each stall, there wasn't a lot of room between once it was packed off.

Q. How were the miners paid in that particular mine? At that time?

A. They were paid on a tonnage rate. They each had their own tokens. When you filled your tub at the road end, you put your token on a bit of string. They had rings on the tubs for pulling and they used to just fasten the token on the ring. When they got to the surface they were weighed as they came off the cage, and checked as well as they took the tokens off. The weight of coal was then recorded to the miner's token. But there was a lot of jiggery-pokery went on.

Q. There were two weigh men there, the weigh man and the check weigh man?

A. There was the management man and there was a check weigh man who was paid by the men. He was paid by the men to see that there was no jiggery-pokery and things were right. A lot of cheating went on underground.

Q. Underground?

A. Yes, in fact if they were caught they were sacked immediately, for taking tokens off and putting their own on. There was a lot of that, it was called ringing.

Q. What about the quality of the coal? You were talking earlier about the white stone being among the coal when you were on the surface?

A. There were two distinct qualities at the Station Pit. One was a steam coal - it was called the Virtuwell seam, which was a steam coal used for locomotives on the railways. And the other ones were the Dumgray seams - they were house coals. Shiny and bright.

Q. This question is more related to the quality of the coal that was filled into the tubs by the miner and if he got some of the roof or floor out..

A. If you did that, you were in trouble, checks were made on the surface. Instead of tipping it straight into the tipper down on to the screens, every so often the management representative commandeered one and it was tipped up to see how much stone was in it before it went into the tippler. If there was a lot of stone after being tipped, they would stop the screen and examine it and relate it back to whoever filled it and they were in trouble - downgraded and sometimes sacked.

Q. What about the size of the coal, the sizes of fragments, was that important at that time?

A. No, because it was the start of the war. I think that before the war when I didn't work in the mine, they used to fill with forks. And all the slack was thrown away. But of course during the war they wanted some slack, first of all for fueling the Lancashire boilers on the surface for generating the power. I think by that time they had started power generation. I wouldn't know, I can't remember that. But certainly in war time coal was at a premium. They wanted the slack as well as the large coal.

Q. So at that time the mine actually generated its own power?

A. Yes, its own power.

Q. And that was common?

A. Yes it was.

Q. Because the national grid, as we call it now, was not yet in being.

A. Well they were just starting it I think. AC current was something that came later. Every mine generated its own power, it had its own generator, its own power house. Lancashire boilers which generated the steam and the steam drove the turbines and it was DC current, which was very inefficient of course.

Q. Anyway, you left your particular job of being a pony driver. What was your next job after that?

A. I went on to the coal face. They decided to experiment with a face conveyor. The first one I saw. That was when I was 16. It was a shaker conveyor and they opened up what I would term a real longwall face - it was about, I think, I'm sort of guessing now, but it wasn't very long - it was probably 60 to 70 meters. It was certainly no longer than that. We had a series of what we called pans...

Q. So this was like, what, 6 or 7 of these stalls all joined together now in a straight line?

A. In a straight line.

Q. And at that time when they were bringing it in, they still had the individual little road ways going up, every 10 meters or so?

A. Yes, they still had the stalls, but the "Pan Run" as they called it was developed in a different manner. They had one roadway at the bottom where it loaded, and one roadway at the top where the engine was situated which drove the shaker pans. But, every so often down the face they had what were termed dummy gates, dummy roads, which again they just set up and blasted and that was to get stone to pack either side to support behind the face. So, they had a series of dummy roads with each road ripped and packed by one man.

Q. It would also, presumably, help to break down the roof in the waste.

A. That's right.

Q. It's interesting looking back from today's vantage where longwalls are fully caved behind, with no attempt to put packs on, except at the road side. Why was that not done right from the early stage? I know it's looking at it in hindsight, but why was it necessary to put the intermediate packs and requiring the dummy gates to produce the stone, rather than totally cave it?

A. We hadn't got support behind to break the roof off, that's why. We hadn't heard about chocks, caving was unheard of. We sometimes built what was termed wooden packs, built with sawn off railway sleepers and old timber. These we left in, mostly used to support sides of junctions.

Q. What was your personal involvement in this? I asked you what your next job after pony driver was and you introduced the face conveyors. Were you involved with the introduction of these?

A. My job was to drive the "Pan Engine" as it was termed. It was a reciprocating engine, with two arms on it, attached to the pans. There were brass bearings on each arm, and they were always hot. I had to carry in a large can of oil each morning, to keep pouring into the bearings through a dash pot. When the oil ran out, I used to pour water on to them. Steam used to rise from the bearings - a bit primitive.

Our father and Uncle Guy were involved in the installation and development of the face. Our father was always mechanically minded. He always thought ahead and I think he had read about face conveying, and as soon as it came he was over the moon. It was called the pan run. It was his pan run. That's why they called him "Auld Pan".

Q. Is that where it came from?

A. Yes, it was called the pan run. It was the first longwall face conveyor in Lanarkshire.

Q. I think it would be useful if you described what the mechanism was. You mentioned it was a shaker conveyor. Give us some more details on how it actually operated, how it got the coal from one end to the other.

A. They were shaker pans insomuch as there were steel pans. I think they were probably 4 foot 6 in length each and they rested on cradles with a little rocker. The pans were bolted together by great big long bolts either side. And that was right through the face. As I have already explained, they were shaken by a little engine there with two arms on, electric, DC, attached to the pans.

Q. Did it have to be inclined downwards slightly?

A. It was slightly inclined, yes. But eventually we had road pans on the level as well, bigger ones, bigger engines in them, but that's another story. The first one, again, fed on to a roadhead, and filled into tubs. They had a bigger road at the bottom end, about 8 feet x 7 feet. There was more coal coming out, so much more coal. The output went up. I attended this little engine and, also, they had to have a fast end away from the engine to put the pack on. My job was to look after the engine and to stop and start the pans from a signal. I also had to assist the filler who filled the coal beyond the position of the engine (toward the fast end). He cast it back and my job was to shovel that coal onto the pans as well as look after the pan engine. That was my job.

Q. You were kept pretty busy.

A. I was very, very busy. And it was hot.

Q. Did the shaker pans deliver the coal directly into the tubs?

A. Into the tubs. The roadway was formed by taking so much roof out and so much floor so that the pans delivered over a bench. The tub was down on rails and the pans shook into the tub. The Panner, as he was called, had big leather gloves on with steel wire down them to level the coal in the tubs and see it was packed properly.

Q. This must have changed the way the miners were paid as they no longer had their individual tubs with the tags on.

A. Each miner had a length of coal called a stint. All the tokens were from the pan run marked P.R. And all the men divided up the tonnage. But, as I recall, there was nearly a strike because the management said it was made easier for them and they lowered the tonnage rate from what they were doing on stalls. But they settled it eventually. I can vaguely remember it. And that's understandable isn't it because they had invested all this money. However, they were getting more coal, so we said, and the output per man must have gone up considerably because of this, and profit. One of the only snags to the pans was the continual shaking and noise. The bolts used to shear or come loose and we had to have couple of men doing nothing else but go down and start from one end, like painting the Forth Bridge, and tighten all the bolts and then come back and start again. With shaking, the pans were loosening all the time. If the pans got split it was a major operation to get them back together again.

Q. So how long were you on that job - operating the pan run?

A. I was on that job about 12 months. Our father by this time was studying for higher things.

Q. Let's get back to him. How did he become an Overman? You introduced him first of all as an Overman.

A. He was an Overman when I went into the pit. He got that job because of his experience. He was a deputy. He was well thought of.

Q. At that time, what were the qualifications that a deputy or an Overman had to have?

A. Gas testing and hearing and I think a little examination on areas and anemometers, working out the quantity of air. Ventilation, gas testing.

Q. But no real written examination as we know it today?

A. No.

Q. And that would qualify him to become a deputy and also an Overman by experience?

A. Yes, that's right.

Q. And you said he was particularly interested in new things - mechanization? This is what gave him the drive to study further?

A. Yes, I think he had studied earlier on but he became ill. He had some operations for stomach ulcers and ruptures and he had to let it go. But he bought a correspondence course - a big red book. I can always remember it was called the Universal Mining Course, I think it was from Cardiff, and he used to get set papers each month, which he sent back and got marks for them. I became engrossed in them too.

Q. That wasn't the one from Wigan was it? The Science and Art of Mining?

A. No, I took that one. That was a mining magazine - Dad's was a correspondence course. He sat for his second class ticket and the first time, I can remember, he failed. He wasn't very happy about that. I think he failed in surveying. I can remember he used to take the dial down the pit and practice. And then he got his undermanager's ticket. Immediately he was given a job with the Coltness Iron and Coal Company. They owned Skellyton Colliery, Cornsulloch, and a little mine called Telford Mine on the Clyde by Garrion Bridge. He was appointed undermanager at Telford Mine. He was everything there, but he wanted a bigger pit. He was a very ambitious man. He always wanted something bigger than a little mine. And then he was given a bigger mine at Blairhall Colliery in Fifeshire.

Q. That's going on a bit isn't it? We left you operating the pan run. Was that your job up until the time you left that area?

A. That was my job until I left, yes. I took over a second pan run as well. And that added to my responsibility - they put more work on me. I had to drill the hole as well for the roadway - one hole. It was a hand borer. Very hard work. I used to feel like my arms were dropping off.

Q. So when you left Skellyton Colliery they were still using the ponies right up to the face?

A. Yes they were.

Q. So what was the reason for moving away? Because Dad wanted a bigger pit?

A. My father wanted a bigger colliery. He then moved from Skellyton. I was still there with Uncle Guy. Dad got his ticket, his second class ticket, undermanager's ticket.

Q. Purely by correspondence course?

A. Purely by correspondence course.

Q. He didn't take any classes - any evening classes or anything like that?

A. I think he did in his younger days. He did - he went to Glasgow Tech, but he took ill. He was out of work for a long time and that lapsed. Then he took this correspondence course and finally he got his second class ticket. He got a job straight away. And he had this little mine. But he was only there for about 4 months. He wanted a bigger pit. They gave him this big pit at Blairhall. I could tell loads of other stories about that pit, mind you - I could go on forever.

Q. Maybe we can expand it later on. I remember at that time you became ill.

A. I got pneumonia, that's right.

2. THE MOVE TO ENGLAND, 1943

Q. You were never really involved with the mine at Blairhall, or were you?

A. In fact, when Mum and Dad moved to Blairhall, I was still in Motherwell hospital, but I was getting better by then. It was just a question of convalescence in the hospital. And then I came across to Blairhall. Meanwhile Dad wasn't very happy with Blairhall. There were two undermanagers. He wanted the lot, he was so ambitious. He had been friendly with a man called Andrew Harley who was then down in England, a director of Pentrich Collieries in Derbyshire. He had been the manager of Swinhill Colliery where our father had worked as a deputy. Now this was during the war.

Q. About 1942 or 1943 you're talking about?

A. I'm talking about '42-'43, that's right. You'll probably tie these dates in better Malcolm. I might be a year out here and there. And I was still convalescing. He had applied for the undermanager's job at Pentrich because he knew Andrew Harley - not only at Swinhill but also when he was sent down to help out at the recovery of the Haig Colliery in Whitehaven some years previously. Our father was a great rescue man as well you know, really into gob fires and such. He knew his stuff, there's no doubt about it. Anyhow, he got this letter from Harley. I always wanted to go to England but Mum didn't want to go. I persuaded him and I said, "Come on Dad, let's go." In that time you couldn't move jobs during the war. You had to go in front of a tribunal. You had to get what was termed your release from your present job to take another one on. And Dad was turned down twice. This was because the Coltness Iron Company wouldn't release him. They wanted to keep him at Blairhall. Then our father fell out with a man called Crowe - he was a mining director of Coltness. I said, "Have another go - keep on going at it Dad." He was sent for by Crowe. I can remember him coming back that day and he says, "Crowe said you can bloody well go then, and you can soak in it - you will never succeed in England and you needn't come back here for a job because you won't get one."

Q. He used the right words to make him go, didn't he?

A. That's right, so off we went.

Q. Before we move on to England, what was the attitude of the family then? Of the Scots coming from that kind of background towards England - I mean was England a very remote place psychologically. Would it be the equivalent now of going to the other side of the world?

A. No, I found it extremely friendly. I found the North Derbyshire people, Ripley where we went to, extremely friendly people.

Q. I'm asking about before you actually came, the thoughts of yourself and Mum and Dad. Was it going to be a strange new foreign world?

A. Oh yes, bear in mind that our father had already been in England quite some time, he went to Cumberland a few times, so he knew the English people, at least if you can call them English people up in Cumbria. They're on the Borders. I wasn't apprehensive. I was only 17 and I wanted adventure, I wanted to get out of Scotland, I wanted to see something different. Mother was apprehensive leaving all her relatives up there, her mother and her father and sisters and brothers, but as soon as she got here she was fine. Of course, we got a lovely house, we were living in a company house in Blairhall. Our father moved down first and he stayed on a farm, Lane's Farm just near Pentrich adjacent to Hammersmith - a colliery village in Derbyshire. This was rows of miners' cottages. He stayed at Lane's Farm and I can remember arriving at Chesterfield's Central Station with Mother, Mary, and yourself. It was dark, pitch black and pouring down with rain.

Q. So with your pushing as a young adventurous fellow to go to this strange country, Dad having been down here for a little while, and Mother being reluctant to leave her friends and relatives behind, plus all of this difficulty with changing jobs during the war, did this give rise to a long period of debate in the family - whether you should go, whether you should not? How was a decision finally arrived at?

A. Dad just said we were going and Mum had to follow. I was very persuasive and I talked Dad into keep on going for his release or he wouldn't have. He would have given up I think. For some reason, I don't know why, but I wanted to come to England.

Q. You were about 18 then?

A. I was 17. 1943, during the war.

Q. O.K. you were getting to the age when people at that time - war being on - would normally have gone into the military. Why was it that you were not called up to go into the forces?

A. Mining was a reserved occupation. The country wanted coal. I did try to get into the Royal Navy in Larkhall. I was 17. They took you at 17 in those days. And they said, "What's your job?" I said, "I'm a horse driver." I didn't tell a lie. I said, "I'm a horse driver." And he said, "Where do you drive a horse?" I said, "At the Station Pit." - "Off you go, when we want you, we'll send for you." So I was turned down. Mining was a reserved occupation and, as you know, eventually the Bevin boys came in.

Q. O.K., so having made that decision to work in mining, three or four years earlier, you were now stuck with it.

A. That's right. I was stuck with it. Oh, by the way, I must go back on this one about me, on the study of mining. When father was studying, I was always looking through his papers and I was also friendly with both sons of the manager of the pit, a man called Johnson. They were both electricians and they were attending Hamilton Academy at night school. I decided to go with them two nights a week, and that's when I first started to learn a little bit about mining education. My schooling was very limited. I left school at 14. And so for about 12 months, from 16 till I was 17, I went to Hamilton Academy, night school.

Q. What was the kind of material you were given?

A. Oh, just a little bit more mathematics than we had at school. Just a bit of further education, i.e. strength of materials, they told us about wrought iron and white metal, capping ropes. Little bits and bobs, nothing advanced, just the rudiments of mechanics.

Q. Basic mechanics.

A. Basic, that's all.

Q. Rather than mining itself?

A. It wasn't mining itself, it was just basic mechanics.

Q. O.K., so you arrived there in the middle of England during the war, Dad having come down a few weeks or months earlier.

A. A couple of months previously.

Q. And he was now..

A. Undermanager at Pentrich Colliery.

3. PENTRICH, BRITAIN AND RIPLEY COLLIERIES, 1943-1945

Q. O.K., and then the rest of the family arrived. Taking it from there from your perspective, what happened to you then? The first few months in England?

A. Well, I got a job at Pentrich Colliery.

Q. And what were you doing there?

A. Ring dragging.

Q. I think you had better explain that one.

A. Well, ring and bar dragging. Rings were the local name for arch girders. From the end of the roads to the faces as such, they hadn't any rails or haulage. They had no transport and we used to have a rubber strip cut from the belt conveyor, wrap it round the rings or bars and drag them to the face. This was the first time I had seen face conveyors, belt conveyors, at Pentrich. English mines were a lot further forward with mechanization than Scottish mines.

Q. So what were the primary differences between the shaker conveyors of the pan run and the use of ponies to take the coal away, that's what you'd left in Scotland, and the English mine. What were the big differences you saw when you arrived at Pentrich?

A. I saw my first endless rope haulage, clips on the rope and tubs. I hadn't seen one before. I hadn't seen a clip before. I didn't know it existed.

Q. And that was the main method of coal transport?

A. Yes, endless rope haulage.

Q. Right up to the face?

A. No, they were subsidiary haulages then. Smaller endless rope haulages but not the big ones. Yes, smaller ones. And conveyors.

Q. Face belt conveyors?

A. Face belt conveyors. We only had one gate conveyor. As I recall the rest were rails and tubs. I must confess I didn't see any ponies at Pentrich.

Q. The method of breaking down the coal was just the same or did they use different kinds of cutters?

A. They used undercut B.J.D. cutters and face belt conveyors. The men had similar stints of coal, similar to the pan run. It was undercut and blasted and filled by shovel onto the belt.

Q. Do you remember any of the manufacturers names?

A. Yes, the drivehead was Sutcliffe conveyors.

Q. That was the face conveyor?

A. That was the face conveyor. And BJD, British Jeffrey Diamond was another one. Now the face conveyors had no structure. There was no face structure. That came later. It was just rubber belting, it wasn't PVC belting, it was all rubber belting and the belt ran on the floor - no structure. The top belt was supported on steel pipes which were hung between rows of props every so often.

Q. So the coal was actually filled onto the bottom belt.

A. On the floor, there was no structure.

Q. Just on the floor, there were no rollers of any kind? Didn't that cause of lot of friction and heating?

A. Oh, it did. But the faces, again, weren't very long. They would probably be no more that 70 or 80 meters, and probably even less than that. They weren't very long, again because they had not got the horse power to overcome the friction. In fact, it used to stall and the way to get it going was to sprag on the top belt, keep pushing the top belt up and down to give it that whip and finally it would take it and that's how we used to get it going. We also put tension on until you broke the belt because the belt was joined with plates and rivets. There was one plate in the middle and two small ones at the end and a steel rod through them and if they weren't absolutely square going through the drivehead they tore off.

Q. I imagine that occurred quite often.

A. It did, quite often. The belt fasteners which used hooks came afterwards, but the first one I saw in Pentrich used plate fasteners.

Q. What size seam was this that you were working in?

A. It was the Kilburn seam, it was 5 foot thick.

Q. So this must have been the thickest seam you'd seen at that stage in your career?

A. Oh yes, I thought it was marvellous.

Q. You could almost stand up in it.

A. First time I'd seen what you'd term a ringer - this was a long steel wedge lever. You'd sort of bang this into the cleat and lever it down from the top. We never had them in Scotland because of the thin seams.

Q. The undercut was still at the bottom of the seam. That was the conventional way of doing it?

A. Yes, that's right.

Q. And the undercut in the coal, not in the floor?

A. In the coal.

Q. The introduction of the belt conveyor onto the face must have changed the work that went on during the three shifts. They now had the conveyors to turn over?

A. Yes.

Q. It was still a three shift operation?

A. It was still a three shift operation. You filled on the day shift, you moved the conveyor over because it all had to be dismantled. Same as the pan run, they had to dismantle all the pans. All they did at Pentrich was to roll up the belt and it was so easy then. It was no problem. And that's also the first time that I saw bars being set, steel corrugated bar and props. The bars were recovered and used again. I think they had to support this way because of the roof conditions. I don't know. I think it was deeper and had more pressure than in Scotland. But also you had to keep a straight line or the belt would ride up the timbers. You had to keep a straight line and you also had to have something to fasten all the pipes to, for the top strand of the belt conveyor.

Q. How was the tension kept on the conveyor?

A. By a Sylvester, hand operated. You used to pull a box back at the end, which contained the return roller.

Q. So it was a manual type arrangement?

A. A Sylvester, pull it back to tension the belt. That was critical because if you over tensioned it, you'd break it. And if you under tensioned it, then it wouldn't go. It was critical.

Q. So you had to experiment with that every time you installed the belt?

A. That's right.

Q. You've not said much about the coal cutters except that they were chain jib type machines. Still at Pentrich going 3 foot 6 or so forwards?

A. No, I think they were a bit more than that, about 4 foot 6. I remember they were a bit deeper than the Scottish ones.

Q. And these also used rope haulage systems?

A. Yes, rope haulage systems onto an anchor.

Q. I can remember those. When you let the rope out, down to where you would put the sprag on, could you clear the whole face length?

A. No, no, certainly no more than 20 odd feet, 30 feet at the most I would think - 10 yards, because it winched underneath to a pulley on the coal cutter and could only hold so much rope.

Q. So when you were cutting down the face then, you could only go in short lengths. You would stop and let the rope out again.

A. That's right.

Q. What were the ventilation system conditions like at Pentrich? Was that also a gassy mine?

A. Yes it was, but it was better ventilated. The roadways were larger and better supported.

Q. What about the big heavy Ceag lights?

A. No it was a lighter lamp. It was marvellous. It was the Oldham. But it was only the officials who had cap lamps. All the miners had hand lamps, electric hand lamps and they weighed a ton. But they were very good. You could hang them up on a prop and have good illumination. But only the deputy and officials had cap lamps. Only the staff had cap lamps.

Q. They were more expensive presumably?

A. I would think so, yes.

Q. And more portable.

A. Yes, more useful for the officials. The lamps for the workmen were not so useful if you had to walk far.

Q. Anyway, your first job at Pentrich Colliery was taking supplies up to the face. And what happened to you after that?

A. Then I went driving a haulage.

Q. One of these endless rope haulages?

A. No, it was a direct haulage, small direct haulage.

Q. Still at Pentrich?

A. Still at Pentrich, yes.

Q. What about getting supplies out to the face, was the same haulage system used in reverse?

A. Yes, it did for one end of the face but there was no haulage at the other end and there were no ponies. That's why they had to have lads dragging with leather straps three or four bars at a time, which I thought was awful for a modern mine. Certainly in Pentrich Colliery they were not as far advanced apart from the main haulages that transported the coal out, but as regards supplies they weren't as good as Skellyton Colliery because they had no ponies. If they had ponies you could put rails up to the face in the roadways and transport the supplies to the face.

Q. Yes, I know that ponies were used at other English mines.

A. Yes, I can go on to the next one and it had ponies. Why I don't know, I have no idea. The men were the ponies at Pentrich.

Q. What was the name of the company that owned the Pentrich Colliery?

A. Pentrich Colliery Company. They owned two collieries. They owned Clifton Colliery in Notts.

Q. So how long were you at Pentrich all together?

A. It closed down after less than 12 months after we got there because they got into financial trouble. They were, so my father told me, having to borrow so much from the government. The government, during the war, subsidized the collieries to a very large extent because they wanted coal at any price. But I think Pentrich was fiddling the books in some way and they weren't getting the output. The government said they weren't investing any more in it. It was closed down during the war. One of the few collieries that were closed down during the war?

Q. The complete company failed?

A. No, they still kept Clifton on.

Q. That must have been quite a blow for you and Dad, having come down to England and cut your bridges behind you.

A. But Father knew that it was coming because we got some faulting as well and that didn't help. A tremendous fault. In fact they lost one seam completely. I remember that, and Dad was drilling like mad and couldn't find it. So he knew that it was coming and he applied for a job at Granville Colliery in South Derbyshire whilst he was still at Pentrich. He didn't tell them. I went with him for his interview. I remember we got a bus to Derby, and a bus there from Derby to Melbourne and then we got a bus from Melbourne into Granville.

Q. No cars in those days? You had to foot it or go by bus?

A. Oh, no, no. Looking back, we could have got the train from Ripley into Burton-on-Trent. And then got a bus from Burton-on-Trent to Granville. Anyhow, I can always remember it. I went with him and I sat in the canteen. It was the first really tiptop canteen I'd seen in my life at a pit. And they had pithead baths. The first time I'd seen pithead baths. This was in 1944. I sat in the canteen and I had this great big bacon sandwich. It was a new canteen as well, it was wonderful. Absolutely marvellous. I recall there was a ship's clock as well in the canteen - and that ship's clock was still there when I took over the management of it in the 1970's. I took over Granville Colliery when I was General Manager at Rawdon. And when I closed Granville Colliery down, I got the ship's clock and had it at home for years and years and years until finally Iris said, "I'll sell that for you", so she sold it. And that was the first canteen and the first pithead baths I ever saw in my life.

Anyway, Dad came out of the interview and said, "I've got the job and the salary is good - better than I'm getting now, but they've got no house." I said, "Well if we've got no house, Dad, we can't live." "They promised to see if they can get us one but they can't promise it." I said, "Where are we supposed to live?" and he said, "Well, they said you can go and rent one but you'll have to rent it yourself." I said, "Well that's no good to us because we shall be worse off."

Meanwhile, Butterley Company had heard of him. I can always remember there was a knock on the door and Benford, he was the manager of Ripley and Britain Collieries at the time, came to see my father. They were in trouble at Ripley Pit with a new seam they had opened up called the Piper Seam. It was a top seam, they had made an inset into the shaft and they couldn't hold the roof up. Weighting all the while. There was an undermanager who was getting on a bit and they asked our dad if he would take over the job as a seam undermanager, one seam, one face, that's all. With the view that if he got over the problems, he would get the undermanager's job of the whole pit when the old undermanager retired. As I said, he was getting on a bit. Pentrich Colliery, by that time had closed down and they were salvaging it. That's why our father was still there. And I said, "Well I'm not going to Ripley with you Dad, I've been with you all the while. I'm going to go somewhere else." And in those days you couldn't really do that, even if I'd wanted, you couldn't because you were directed and I found myself at Britain Colliery.

Q. It was owned by the same company?

A. Owned by the same company. Owned by Butterley Company.

Q. Tell me about your work at Britain.

A. Well at that time I was 18 years of age and I was put onto the coal face. I was a caster.

Q. I'm assuming the system in Britain was the same with the face conveyors?

A. Face conveyors were the same.

Q. What was a caster?

A. A caster was what I had been doing in Scotland, only I was underneath the face then. They had to have long fast ends to put a pack on, because of the roadway conditions. You had to put a six yard gate pack on that side, because the roadways were higher, it was a thin seam. It was only 3 foot thick, it was a yard seam and they had to have a long fast end to accommodate the dirt and to make a good roadway. I was employed by the miner who was a filler across the gate and all this fast end. I was the one who had to cast it back and then put in on the conveyor.

Q. When you say you were employed by him, did you mean that he paid you?

A. No, no. I was paid by the company. By that time there was no butty system. The butty system went out after the longwall system came in. After the stalls, when they brought in the face conveyors, the butty system was discontinued.

Q. But it was still predominantly a piece work type of arrangement? Miners were paid for how many yards they took?

A. That's right. It wasn't on tonnage in Britain either. It was on yardage, there were no tokens as in Scotland. It was on yardage. Each man had so many yards, so there was no fiddling. Each filler had his yardage (stint) marked out by the official and the face chargeman. He was a filler working on the face and was paid a nominal sum by the company to be in charge.

Q. So, recapping then. You were about a year at Pentrich with Dad, then that colliery closed. He went to Ripley, you went to Britain. Wasn't it at some time during this period that you began to undertake mining studies seriously?

A. Yes, it was. I went to St. John's School in Marehay for evening classes. The old headmaster was a wonderful chap. No, it wasn't then. I didn't start that until I went to Ripley. I didn't go to St. John's till I went to Ripley, Malcolm. I was still at Britain. The first time I'd seen a gate conveyor with pans on was at Britain. There was a difference in the face conveyor because they had to have a plough across the face belt to get the coal to load onto the gate conveyor which was below the seam level.

Q. There was still a bottom belt conveyor on the face?

A. Still a bottom belt conveyor because it was a thin seam, with a plough dropping the coal on to the gate conveyor. It was the first time I had seen covered bottom pans.

Q. And the gate conveyor had what we now recognize as modern types of rollers?

A. Well, it was fairly primitive. There was no semi troughed rollers. There was a lot of spillage. It was flat. They used to put up a side plough but it used to get in and clog the bottom belt and stall it and break the belt and lumps got fast. The gate conveyor was taken up every month, only about 150 yards long.

Endless rope haulage was moved in when the belt conveyor was taken up.

Q. So the first gate conveyors then were simply a means of not having to extend the tracks?

A. Getting the coal away from the face quickly, loading off the face conveyor onto the gate conveyor and then via a chute into tubs.

Q. How did they advance the gate conveyor? Just by putting another pan in?

A. That's right. When they lay up to within about 20 yards of the face, they had all the pans stacked up on the side of the roadway and all the spare belting rolled up.

Q. So there was no kind of loop take-up in those days to facilitate the extension?

A. No, no loop take-up. It was purely, again, on tension with Sylvestors.

Q. So it was just like a heavier version, with structure.

A. With structure, and less friction because you had rollers. I moved from the Yard Seam, with the bottom belt conveyor into the Black Shale Seam, and that was 6 feet high. It frightened me to death.

Q. It was a big one, huh?

A. For the first time I saw covered pans - top loading - on the face.

Q. What was your job there in the Black Shale seam?

A. Cleaning out the tension end and keeping it clean. And that was a full time job, but also helping the man in the fast end again. It was shovelling all the while because although they were covered bottomed pans, there were spaces in them and you used to get the coal dropping through on to the bottom belt. We had ploughs every so often and it got fast at least 20 or 30 times a shift.

Q. That was a dangerous job as well wasn't it? I remember my days in the mines having that lesson about not getting your arm into the tension end, otherwise you couldn't get it out.

A. And I also had a bit of coal to strip off in the fast end as well. Then I took ill again. Ventilation wasn't very good at Britain and in the Black Shale - you know, having a thick seam like that we didn't get the quantity of air coming through for the thicker seam. And I got some dust on my lungs.

Q. So this was a recurrence of the pneumonia you had when you left Scotland?

A. Yes, there was a weakness. So our father said you better come to Ripley because I've got a job for you. I said, "What job is that?" He said, "I want you to be a linesman." One of the main troubles at this face is that it's not straight - the roadways were not kept straight and the faces were not straight.

Q. But you'd not started studying at this time?

A. This is when it started. Any my father trained me on how to put lines on, I had to get back sights and foresights and put lines on the rings and arches and all the props, and put a face line through as well.

Q. This may be a good place to stop for the moment. That's really covered your very early days through Scotland, the move to England and your work as a manual worker up to the time when you started studying.

A. I go back to manual working after that.

Q. We've reached the stage where after a year at Pentrich the mine closed down, you went to Britain colliery, Dad went to Ripley which was fairly close bye. Did we get how long you were at Britain?

A. About 12 months.

Q. So this is now into 1944 - 1945? A year at Pentrich, a year at Britain.

A. It was June at that time when Iris and I met. She lived only about 4 houses from me on Lowes Hill. We met at a dance in Ripley Drill Hall, and I said, "Well I'd better see you home because there's all these soldiers about." I escorted her home and that was it. We started courting after that.

Q. This was when the war was in its latter stages?

A. Yes, we then moved to Gordon House, just outside Ripley. It was a Butterley Company house. We still lived in Lowes Hill for a time. Butterley Company paid the Pentrich Colliery rent for that house until we moved to Gordon house.

Q. So this was when Dad was first at Ripley.

A. Yes, he took over all the pit shortly after I went there.

Q. Let's go back to the stage when he first went to Ripley. He was in charge of just one face and one seam.

A. Yes, it was called the Piper seam.

Q. And how difficult were conditions there?

A. Not good, bad roof conditions, soft floor, the roadways and the face were not straight so we had no proper roof control. We introduced wooden chocks between the stone packs, and the releases for them were bricks. We put half bricks in between the hardwood chocks as a release when we took the wooden chocks forward. We would use our picks to break the bricks out and release the chock. I carried on this system when I was undermanager at Denby Drury Lowe Colliery many years later.

Q. And that was a way of giving a sharper breaking off line. But you were still using packs.

A. Still strip packing, that's right. But we had wooden chocks in the wastes. That did the trick. By straightening up the face line, by getting better roof control with chocks, instead of the wastes flushing right over the conveyor, we had a breaking off line and angled the packs as well so that the roof caved in behind the chocks. Dad and I used to spend hours talking about this, roof control, and by that time I was studying mining and reading like mad and learning things from other people - what they were doing in other pits.

Q. Let's go to that stage. You moved to Ripley under Dad's influence because he wanted you to start learning more about the theory of mining as well as just the practice of it. But where did that impetus for studying come from?

A. Myself.

Q. It was yourself? It wasn't Dad pushing you, saying this is what you have to do?

A. No, he never pushed me at all. I wanted it. I then decided that I wanted to be a colliery manager one day. That's all I wanted to be and I knew I'd have to really start and burn the midnight oil, because, you see, my education was very elementary. The person who helped me a lot in mathematics was Iris. She had been to Swanwick Hall Grammar School and her mathematics were way better than mine. I started to learn about trigonometry and algebra. Well I'd never had trigonometry and algebra and you had to have these subjects for surveying. I'd never heard of them. Iris knew all about it. She taught me a lot on maths. Finally, of course, I had to go on from there and take logs and differential calculus. I left her behind then but she was an absolute wizard in bringing me up to standard.

Q. Looking back on it now, at that time the country had gone through - was still going through - the trauma of war. You were in the coal mining industry and because of that you'd not been involved personally in the war, you'd not been a member of the armed forces. Casting your mind back, what did you see as the future of coal mining in the U.K. at that time and your ambition to be a colliery manager as part of that. Was it something that looked as though it was going to have a long future and give you a good career?

Q. Oh yes, I never thought it would ever end. I never gave it a thought that I was working in an extractive industry - and every ton of coal we took out had gone forever. It never crossed my mind. I thought that was it. There was plenty of coal and I thought that it would last forever. It was not until I came to Leicestershire when I started studying all the seams there, all those exercises about how long this coal would last. I never gave it a thought. I thought Ripley pit would go on forever and of course they've gone years and years ago. Never gave it a thought. I think when you're that age you don't think that way, you think it's there and going to be there forever. You don't think about 10-20 years ahead. You sort of live from day-to-day, week-to-week, month-to-month, year-to-year. It certainly didn't happen with me anyhow.

Q. We've got two streams going now. Having moved to Ripley you were then still employed as an underground worker, one. And two, you were embarking on studies as well. Let's take these one at a time. What were your early jobs at Ripley?

A. Well, as soon as father - after about 6 months, probably less than that, the other undermanager retired and father took over the whole of Ripley pit as undermanager. A big pit it was then. He said, "You'd better spread your wings. I'll give you an assistant, you pick somebody out to cover the whole of the pit then - to put lines in roadways." And I said, "Well I'm afraid I can't do face lines as well." He says, "Well, we'll get the shotfirer and we'll train him to put a line through, and once a month or so we'll check it."

Q. Separate out for us what you mean by these two things. Putting lines on for the whole mine and putting lines on for the face. What was the difference and what was the purpose?

A. Well, to keep the roadways straight - the conveyor road - at that time we had conveyors that went the whole length of the road to the face finish. Sometimes tandem conveyors were installed because of distance. If the roadways started to wander off line, then the conveyor fouled the side of the roadway, so it was vital that you kept the roadways absolutely straight. When a face started off the surveyor would give you 3 stations in the heading and I carried that forward, backsights forward until I was not certain whether they had moved off line or not. He used to come down about once every three months and check it and put some more stations in.

Q. So these lines were just put on by vertical strings hanging?

A. Plumb bobs, looking through two plumb bobs and an assistant holding a lamp in the distance. We put the marks on and just whitewashed lines on the roadway supports, all the way through.

Q. So you were actually working with a surveyor's group then?

A. Yes, I was, but I was still employed as a workman. I wasn't on the staff yet. And then I said to my dad, "I can't carry on this forever. I've not got the experience yet. I know what's on the coal face, I've worked on the haulage, I've been down in the pits since I was 14 years of age, I'm now 18, I've got to get some experience." He was going to start some headings with a new machine, a new heading machine called the Anderson Boyes shortwall coal cutter. It had a 7 foot fixed jib and it used to go in at one end and cut straight the way across. I went with two very experienced and very wonderful people, one called Freddie Grace, the other Frank Murfin.

Q. To get this clear, was this just for advancing the gate roads, this was not a face machine?

A. It was for driving headings in the coal and opening up faces. Called an Anderson Boyes shortwaller.

Q. And you mentioned face lines separately.

A. Oh yes, well that was to keep the face straight, again because of the conveyor and roof control. Obviously the longer the coal face is, the more important it is to keep it straight. If there is a bend, the conveyors would ride up, spilling off the coal, and you haven't got a straight line for breaking off the roads behind the supports.

Q. You did that with the same system using plumb bobs.

A. Yes, plumb bobs. If the face was badly off line, we would put a part line through the face somehow and then we would have what were termed "fly cuts" - you would have to miss a bit cutting the face and taking the coal out. This would gradually get it back into line.

Q. And you mentioned the gate conveyors now running the full length and putting additional gate conveyors in tandem.

A. Tandems, yes.

Q. Tandems, so this was still before the modern type of loop take-up?

A. That was just coming in then. We had a loop take-up on the conveyor which was moving up every night. So instead of having to put in 9 feet of belt, short pieces of belt into the conveyor that you laid up, we used to have about 30 feet in the loop so we just let the loop off. That was a big advantage because with longer lengths of belt you had less fasteners so the less likely it was to break and rip. That was a great advantage.

Q. They were still rubber belts?

A. That's right. PVC belt only came in after the Cresswell Mine disaster. You know when that big conveyor fire happened and 70 men lost their lives.

Q. That's a question I wanted to ask. What was the incidence of conveyor fires - did that happen very often?

A. No, they didn't. We'd get the odd little smouldering that was soon put out. We did not have the legislation we've got now and the controls that we've got now, either. But you see, Cresswell was much more advanced. They had conveyors right to the shaft bottom. A lot more conveyors than I'd been used to. Whereas we still had endless rope haulage into the shaft bottom and just roadway or gate conveyors, as we named them.

Q. So you had rubber belt conveyors on the face, you had belt conveyors in the gate roads and those loaded into tubs?

A. Bigger tubs. Big ones then. Probably about 18 hundredweights.

Q. Less than a ton? And the coal cutters, you mentioned the AB shortwall coal cutter coming into Ripley. The coal cutters that were conventionally used on the face at that time, had those advanced very much?

A. No, they were still basically the same, they hadn't altered at all.

Q. Using the rope haulage to pull them forward?

A. Exactly the same.

Q. How long were you doing that job? Linesman?

A. About a year.

Q. And this is the time when you started studying seriously?

A. That's right.

4. THE BEGINNING OF STUDIES

Q. I know at that time, working with the surveyors and getting a surveyor's certificate was a conventional route to obtaining manager's certification. That was the way that young mining engineers conventionally went through it. Is that what you did?

A. No, I didn't get any surveyor's qualifications at all. I hadn't got time. I didn't believe I had time. I wasn't much interested in surveying anyhow.

Q. Let's take that other stream now. Your studying stream. Did you start taking classes at a local college or school?

A. Do you want to continue on that or do you want bring my experience in at the same time?

Q. However you feel most comfortable describing it. I'd like to cover both sides. Let's take it in parallel.

A. Well, let me do my education up to getting my colliery manager's certificate, and then we can go back from there. I went to St. John's evening classes at Ripley, and took them as far as I could - I went there for about 12 months and the old headmaster said, "Look, you're too good. You ought to go to Heanor Tech. You've reached as far as I can take you."

Q. What sort of subjects were you taking at St. John's?

A. Elementary stuff again, to bring me up to standard, just elementary stuff. Nothing specialized at all. And I said, "Well, how do I get to Heanor Tech?" And he said, "You go and enroll. You get on the trolley bus at

Ripley market, you go to Heanor and it's just there. Go and see the Principal." So that's exactly what I did. I didn't see the Principal, I saw the Vice Principal who was a chap called Ashton, J. R. Ashton. I think you probably knew him, Malcolm. He was the Vice Principal. And he said, "Well, we do a day release course here, come for one full day and two nights a week, night school, and if you don't attend the night school, you don't get your day release." I said, "Well how do I get day release because I'm working sometimes 7 days a week," and I was. Certainly 6 and mostly 7 - even Sunday. He said, "Who's your company?" I said, "I work for the Butterley Company", and he says, "Oh that's easy, we have students from there - do you know a chap called Joe Lynam?" I said, "Yes, I've met him, he's on the face." And he said, "Well he's studying. You better go and see your colliery manager. And ask for permission to have a day off to come to school to study mining."

Q. This was still Benford?

A. Benford, yes. So I spoke to our dad. I said, "Will you have a word with him?" "No", he said, "You'd better go and see him yourself." Off I went to see him. He said, "Well we don't normally give it until you've done at least 3 or 4 terms on your own bat and if you're good enough, and your exam results are good enough then we might consider giving you a day off paid." And you know Malcolm, I had a job on nights coal cutting, the job our father used to do. I came off shift at about 7:00 in the morning, I had to be at Heanor Tech at 9:00, did not get home till 5:00 and back on shift at 10:00. And my two evening classes, I used to be back home at about 9:00 and down in the pit at 10:00. I was burning the midnight oil studying. I was doing pretty well after a couple of terms but I could feel myself starting to flounder - I was working so hard, physically and mentally. And Ashton, bless his old heart, said, "We'll have to do something about you, Jim." And something must have happened. I don't know what, he either rang up Montague Wright or the Butterley Company, I'm just surmising this.

Q. Wright was a senior official?

A. He was the managing director. All of a sudden I got a letter from the Butterley Company saying, 'We have decided to grant you a day release. We shall watch your progress with utmost interest.' Something happened. Ashton must have done something about it. I met some wonderful people on the Day Release. Joe Lynam, by the way, died last year. Iris and I went to his memorial service at Wainsgroves outside Ripley.

Q. Joe Lynam?

A. He worked at Ripley pit. He was a good man. I was his best man when he got married. We studied together at Heanor Tech. About this time Iris and I got married. I was 21.

Q. Go through the subjects that you were doing at Heanor during this period.

A. Well, we studied electricity, mechanical engineering, surveying and levelling, geology, winning and working, explosions and fires, etc., all the subjects that you took on your exam in effect. The whole lot, legislation, all the subjects. It was a 6 part paper. And you had an oral exam afterwards if you passed the written exam. It was tough because you had to get 50%

pass in each subject and overall you had to have 65% when they were all added together. And then your oral examination, they added that, so to get 65% overall you had to get at least 80% on your oral before you got your ticket. Anyway, I got my second class ticket.

Q. Who were the examiners? What was the examining authority?

A. I went to Doncaster for mine. That was the centre. It was held under the auspices of the now Mining Qualifications Board.

Q. This was a national examination? The same exam as taken by students throughout the U.K.?

A. All over the country. The oral examiners were eminent mining engineers.

Q. So they were practicing mining engineers?

A. Yes, practicing mining engineers, took the oral examination.

Q. So does that mean the oral examination was more a test of your practical know-how?

A. Practical know-how, yes, apart from the manager's oral which I'll come to. That was a bit different.

Q. O.K.

A. So the marks, you had to have very very high marks because it wasn't that you could get through in just one subject. You had to have an overall percentage and it was very difficult. It took a long time as well. I started studying at about 18 years of age. I was 24-25 before I got my manager's ticket. That's a long time. Before I got my second class ticket, they had to set on supports economy officers at the pits.

Q. That job sounds like it was really looking after the economics of the support system.

A. Yes, we were all on steel supports by this time and they were losing them like mad. They had to get them out of the waste when they moved the packs and chocks forward. I had to go round like a steel bobby if you like, and count the props, see where they were being lost, cost them. It was good training.

Q. So the steel props came in and took over from the timber props.

A. Yes.

Q. During the time you were at Ripley?

A. Yes.

Q. Did they bring in the steel bars at the same time?

A. Yes.

5. JUNIOR OFFICIAL POSTS, 1945-1951

A. By that time the mines were nationalized - 1947. After the war. I got my undermanager's ticket in 1949. So it was well into nationalization. Yes, they had to appoint supports economy officers, because they were losing so much steel. After I obtained my undermanager's certificate, a sub-area mechanization engineer's job came up in the area, No. 5 Area at Eastwood. And I applied for it and got an interview. Tommy Wright, the sub-area manager, was on the panel. He became area general manager eventually. And the first question he asked me, he said, "You've got your second class ticket, Jim? When are you up for your manager's?" I said, "Next week." And he said, "Well, I wish you the best of luck. And where do you want to get to?" I said, "Well I want to be a colliery manager." "That's great", he said, "marvellous." And he said, "Have you ever been a shotfirer or a deputy?" I said, "No." And he said, "Well, you've been on the wrong track, lad." I said, "What do you mean sir?" And he said, "Well, to get to be a colliery manager you've got to be a shotfirer and a deputy and an overman. You've got to be an undermanager and then a colliery manager. And the job you're doing now, as important as it is, will never get you to be a colliery manager. You go back to your pit, lad, and you'll be hearing from me." And within 2 days I was told to report to New Langley colliery and see the manager to get authorized to be a shotfirer. I couldn't go because I was going to Doncaster to sit for my first class ticket. Anyway, to cut a long story short, I went and I failed the first time. I failed in surveying. The one I didn't like. I passed every other paper and I failed in surveying. I went shotfiring.

Q. What mine was that?

A. That was New Langley. I went to New Langley from Ripley.

Q. I can't remember where New Langley was in relation to Ripley.

A. New Langley? Heanor.

Q. So you started there as a shotfirer?

A. That's right.

Q. And you had your undermanager's ticket by this time. Didn't you have to take a shotfirer's test?

A. No, having obtained your second class ticket, all you had to have was a hearing test. So I went to the local doctor and got my ears tested and that was it. And then I failed in surveying for my manager's ticket so I burnt the midnight oil. The exam was held twice a year. I took the written exam again and passed it - surveying as well, what a laugh. And went through to the oral. Before the oral examination for a manager's ticket, you had to take a surveyor's dial and go underground yourself with one assistant and do a survey and levelling. Then do all the mathematics, and plot it, put it on a plan and take that with you to the oral examination.

Q. So surveying was still a very important part of qualifying?

A. That's right and you had to take all your notes. Did you know this, by the way?

Q. I recall it as something that was done but I never went through it myself.

A. That's right, so you had to go with this great plan rolled up in your arms to Doncaster, with all your notebooks and with all the calculations. You were questioned on all of it. I think what got me through my oral was my knowledge of mechanization. At that time they were just bringing in the curved jibs and the Meco Moores and I was into that. I was so interested in mechanization like our father was. And the chap that took me - I think it was Samson, he became the divisional production director at Sherwood Lodge, Notts - he took me for my oral. And he was so interested, as soon as he saw the plans, he said, "Oh, mechanization, come on - what do you know about it?" And I started to tell him about what I'd seen and what I thought was going to happen. "Great, lad", he said, "Great, lad." So I got my manager's ticket. And then I went deputying at New Langley. And the manager, who was a chap called Hubert Hyde, was manager of New Langley and Lodge Collieries at Eastwood. I was only deputying a short while, and he said, "Look, I want an overman and you're the lad for the job." So off I went as overman at Lodge Colliery. The reason, I think, that I was sent to Lodge colliery as overman was because they were just developing a face to install the first armoured face conveyor in the U.K. and the first prototype trepanner. I believe Tommy Wright, the sub-area manager, was responsible for me being sent to Lodge Colliery.

Q. Let's backtrack just a moment because we went off on your education.

A. Right, we've covered my education. I got my manager's ticket. So now we'll go back to where we were before.

Q. That's right, and we left it at the stage where you had moved from Britain Colliery to Ripley as a linesman. At Ripley, you had belt face conveyors, and still at that time the old conventional undercutting coal cutters. Now take us on with the development of mechanization.

A. The further development at Ripley pit, which I can remember, was to do away with all the endless-rope haulages except in the return airway for supplies, and to bring the conveyors into the pit bottom. I remember our dad and Wilf Sparram, the senior overman, planning this operation. I helped in this as well, I did all the lining and levelling for it. We finally found ourselves with a loading station in Ripley pit bottom. They fetched me off the coal headings to help plan and install the conveyors. And then I went back to the coal face doing numerous jobs, packing, filling, coal cutting. Ripley Pit then combined with Denby Hall under one manager.

Q. You mean joined physically underground?

A. Yes. Joined together by driving a new underground roadway, transporting all the output from Ripley and Denby Hall via a surface drift at Denby where they had built a new coal preparation plant. Ripley and Denby Hall shafts became service shafts. Shortly after this, I was appointed supports officer.

Q. Before we get into that you talked about the development of the first pit bottom loading station. That was loading into what, still the big tubs?

A. The big tubs, yes, about a ton.

Q. So the coal was loaded into the tubs very close to the shaft bottom.

A. Yes.

6. THE START OF POWER LOADERS

Q. O.K., you wanted to say something about mechanization.

A. What I wanted to say is that at Ripley, where our Dad was undermanager, we experimented with what was called the Shelton loader. This was the first mechanized power loader I had seen. This was before the Meco Moore. And it really was just an ordinary coal cutter. Whereas, instead of the picks and the chain going round to undercut the coal, a special chain was put on the jib with flights which went the same way. We had to have a bottom belt conveyor again - the loader couldn't lift the coal up onto a top belt conveyor. We undercut the coal using a conventional coal cutter, drilled it and blasted it to hell in front of the Shelton loader. You could just load it then. If you got too big lumps then the flights wouldn't take it.

Q. So you had two machines, one for undercutting, drilling and blasting, and behind that was the Shelton loader. It was the same machine except it had flights on instead of the picks.

A. It wasn't very successful because we lost a lot of coal by blasting, and we required manpower to clean up and set supports behind the loader.

Q. This was still drawn forward by the rope?

A. That's right.

Q. That must have been awkward.

A. It was, yes. And we got a lot of roof falls as well because we had to blast the coal in front of it and there were no supports set between the two machines. But it was the first stab at mechanized loading at the coal face. Someone had realized that rather than having to have men shovel the coal onto a conveyor manually, they were going to have a machine do it. The principle was absolutely correct. It had to be. This was the way forward.

Q. These two machines moving down the face, with drilling and blasting going on in between, how far apart would they be?

A. About 20-30 yards. Sometimes they got too far in front in order to separate the blasting of the coal from loading, and this caused roof control problems and time wasting. But it was an experiment, it was one thing we had to go through. A loader, to load the coal, rather than shovel the coal manually, and if the Meco Moore had never come out, who knows, it may well have developed further in that way. I think it probably did with the trepanner.

Q. So it was successful in its own right.

A. It was, it had a lot of drawbacks, obviously, and wasted a lot of time but in principle it was the first attempt to load coal by a mechanical means onto a face conveyor.

Q. How was the timbering arranged, because presumably you had to get props up as soon as you had blasted.

A. No, that was the problem. We had to wait until it was loaded. That's why we had the roof falls.

Q. How long did that last, the Shelton loader?

A. Oh, I think about 3 or 4 months and then we took it out. Took it out and went back to hand filling again because we just couldn't control the roof. We tried extended bars from existing bars. It never worked, they dropped down. So, that was the first, what I would term, the first real face mechanization that I can remember. And then I went to Denby Hall with my supports economy job - and that's where I saw the first Meco Moore.

Q. Where did the idea for the Meco Moore come from, did it come from the manufacturers, from Anderson Boyes?

A. Manufacturers - Meco Engineering and Anderson Boyes, with help from the National Coal Board, their mining and mechanical engineers. Obviously they could see that they weren't going to get the amount of coal that was required, at reasonable cost, by continuing hand filling. And so I saw the Meco Moore working for a short period. I didn't work much on it. I saw it and that's all you can say. I was interested, I knew the controls of it, I had a go at operating it as I usually did.

After the interview for this sub-area mechanization engineer's job, I found myself put on the right track by Tommy Wright, as a shotfirer at New Langley Colliery, with a drop in money too. I was married by this time, and Jane had arrived. And Iris says, "Well, is this what you got your manager's ticket for, a drop in money?" I then became a deputy on the afternoon shift at New Langley. I had no car. I used to have to catch the trolley bus from Ripley Station, and the last trolley bus back was 11:00 o'clock from Heanor Market. Sometimes I missed it and I had to walk home. Because you daren't leave if things weren't right in those days.

Q. That was about 4 or 5 miles?

A. That's right. Anyhow, then I went to be overman at Lodge and that's where they were going to install the first armoured face conveyor in the country and the prototype of the trepanner. I was put in charge of the installation.

Q. Let's get this in order. The Meco Moore came in first, still with the belt conveyor on the face.

A. Bottom belt conveyor, yes.

Q. And still with the steel props and bars. What was the major problem with the Meco Moore?

A. Well, it was the space you had to open up on the face side. It was a huge machine. It had to have a stable hole at either end of the face, because when it got to one end you had to split it down. That was done on the night shift. You had to split the loading section away from the conveying section, away from the cutting section. And it was a whole shift's job, once it got into the stable, to strip it down, spin it round and re-erect it ready for the next morning. It was an arduous job and more times than not we were late, it was into the middle of the day shift before it was ready. It opened up a lot of ground, unsupported - and the lump problem as well held it up. The lumps of coal that came off it were enormous. Bearing in mind you had a bottom jib, a top jib or a middle jib, and a shearing jib up the back. And it took 4 foot 6 out in depth. Well you think about when that started to break away and come along the belt conveyor. It was still rope haulage by the way. We still ran a haulage rope out, there was no chain haulage then. It was rope haulage and a special thick rope, double rope actually because it went round a pulley at the end and came back to the machine, so you got a double purchase for it, because the machine was so heavy. They had a very very nasty accident at Denby Hall with the Meco-Moore, 7 men lost their lives in the stable hole. Our father went to that. The stable hole collapsed. Buried all the stable hole men. You see, they had to get out so much room, Malcolm, for the size of machine. The stable hole had to be about 8 yards in length from the fast end, and had to be at least three yards in front of the face line. With all the bars and props set. To split and turn the machine round ready to go back up the face line, they had to knock out most of the supports.

Q. So they had accidents at the fast ends with the large open ground that was necessitated by the Meco Moore. And was that really the thing that finished it? It was the roof conditions?

A. Possibly so. They would have probably developed a better machine, a more streamlined machine. But it was still the size and the noise and the dust as well. It gave tremendous dust, all those cutting chains going round.

Q. Did they have water sprays on them?

A. No, there was no dust suppression then. It was after that when we had to control the amount of dust in the air, airborne dust regulations came in. I think what really killed it in the end was because it was a cyclic machine. In other words, it was a cutter loader but you had to stop and turn it round, so it was out of production two shifts out of three. It was a cyclic machine and, of course, to get the best it has to be non-cyclic. And then you are producing coal all the time.

Q. So the three shift system with the Meco Moore was still there.

A. Yes.

Q. It was still cutting on one shift, second shift and third shift they were dismantling the machine and turning it round.

A. Packing and ripping as well. Moving the conveyor over.

Q. The conveyor came over on the third shift?

A. No, the conveyor came over on the second shift. And the third shift they had to, well, they had to split and turn the machine, go into the second shift as well. It took as long as that. It was a tremendously cumbersome job to do. It took a long time.

Q. O.K., you mentioned the trepanner. Was that the next machine to come along?

A. Yes, it was a prototype and virtually all it was, was an ordinary coal cutter again, but instead of the jib, they messed about with the gears inside and instead of making a jib undercutting, they made a wheel on the end of it, a trepan wheel, which they rotated through gearing, and put the coal onto the conveyor, but in order to do that they had to have a different type of conveyor. The machine still went on the face side, they hadn't got the overslung gear box at that time, it was still a straight coal cutter with this wheel on the front end with cutting picks on.

Q. So what you're saying is that there is still a line of props between the machine and the conveyor at that time?

A. No, we had the first armoured conveyor, with the conveyor for the first time right up to the coal face.

Q. O.K., so that's when you had the armoured conveyor coming in.

A. They both came in together. The trepanner and the armoured conveyor. And it was called the Huwood Python conveyor. It was always breaking down. The chain was always breaking. I found the fault from sitting and watching it at the drive head. They got a little bit of a neb on the end of the flight on the chain and that was catching on the sprocket, it was jumping on the sprocket and breaking the chain. That's why Huwood took me out and gave me a couple of pints of beer for curing the problem.

Q. That was your reward?

A. That was my reward, that's right. Never mind, it got the face going. For the machine we had to have a buttock at one end so it used to work in front of the conveyor, come forward with the armoured conveyor smack up to the face. We used to have to set props on the edge of the conveyor up to the face because we used to have carry-back of fine coal on the bottom chain. This would lift up the pans and you lost the horizon, and could cause jack knifing of the conveyor into the roof. The trepanner was just like an auger, augering the coal onto the conveyor and it was very successful. It cut it and it loaded. It didn't for a start because we hadn't got enough cutting elements so it wouldn't take it. We used to break the rope frequently. So we finished up by installing large breaker picks in the head. This solved the problem.

Q. It still used rope haulage?

A. Still a rope haulage, yes. We undercut the coal first using a coal cutter. We held the conveyor back and undercut it. At least we didn't get the lump problem, and then cut it and loaded it with the trepanner. We proved the point that we could cut and load onto an armoured face conveyor. It was single ended so when it got to the other end we had to have a stable hole again and turn it around so that it would come back the other way. So that became a cyclic machine as well. But we could see the potential because we decided that if we could have a cutting end at either end of the machine, we wouldn't have to turn it around. We could just shunt it in and come back the opposite way. So at least we had proved that we had, in principle, a machine that would cut and load onto an armoured face conveyor. Although the Python conveyor wasn't much good - not robust enough. We went on to the Westfalia Panzer, the German heavy duty conveyer. That was very much better.

Q. What was the factor that necessitated the move from a belt conveyor to an armoured face conveyor? Was it simply the amount of coal that had to be moved?

A. No, it was to get a prop free front. You couldn't get a prop free front with a belt conveyor. And you had to dismantle it as well.

Q. And the other thing that I was missing there was the snaking capabilities.

A. That's right, you had to dismantle a belt conveyor to move it over, an A.F.C. moved over in one piece.

Q. But at that stage you were still using steel bars and steel props.

A. That's right, and we got the steel conveyor over by using ringers (steel levers) on the waste side and men pushing it over manually.

Q. Was it kind of difficult to control the snaking, keeping it straight?

A. Well, we just learned by experience, that's all. As I said, the Huwood Python conveyor was not a good conveyor. It did the experiment for us but it was quite obvious to all of us that we were going to have to get a better conveyor. Better races, better chains, better pans, better everything.

Q. So it was an experimental conveyor?

A. It was an experimental conveyor, yes, but we did at least prove the principle that we had a machine and we had the potential for cutting and loading. And the potential for going forward to a non-cyclic system of mining.

Q. All right, so we moved from the Meco Moore to the trepanner, the armoured face conveyor came in at the same time as the trepanner. Did the introduction of the trepanner do away with the Meco Moore? Did those disappear entirely?

A. No, they continued up and down the country for quite some time. In fact, I then was asked to go by Wilf

Crossland. He took over from Tommy Wright as sub-area manager. Our father was undermanager at Ormonde and they were installing a Meco Moore and our father wanted some help because none of his officials had any experience with mechanization at Ormonde.

Q. The one you were talking about was at Denby Hall?

A. That's the first one I saw. They were going to install a Meco Moore at Ormonde in the Blackshale seam, and our father asked for me for some help and I was sent to help install the Meco Moore machine at Ormonde.

Q. We got ahead of ourselves. The last we heard of Dad he was still at Ripley. Now you moved to Denby Hall. When did he go to Ormonde during this period?

A. I think he went to Ormonde in 1948-49. I was shotfiring then at New Langley.

Q. O.K. let's get back to your career progression then. After being linesman at Ripley, you became supports economy officer. You continued that job at Denby Hall where you had your first experience with the Meco Moore. After a period as shotfirer and deputy at New Langley you were promoted to overman at Lodge. What was the system then at Lodge by the time you were working there?

A. Hand filling longwall.

Q. So that was not a mechanized mine? You'd seen these developments at other places? Take it from that point on. What happened to you then?

A. After the trepanner experiment, the machine and conveyor were taken out for modifications. I stayed at Lodge for some time as overman. Tommy Wright had been promoted A.P.M. in No. 4 Area.

Q. Area Production Manager.

A. Tommy went to Area Production Manager - he was promoted - and Wilf Crossland became the sub-area manager. They were installing a Meco Moore at Ormonde and there were no officials at Ormonde who had any experience with any mechanization in any shape or form - only our dad. They wanted some help. And I think Dad asked for me, he did. So I went to Ormonde to install the Meco Moore. And it was very successful. Dad insisted that we had a compressed air line to operate compressed air picks to break the large lumps. They were a Godsend. We got it buried once.

Q. Same problem?

A. Same problem. Got it buried.

Q. In the fast end?

A. Yes, just coming out, cutting. I can remember I went in and drove it out. Drove it through it. Nobody else would touch it. Anyhow, that's another story.

After this period, the National Coal Board were selecting young mining engineers for further educational training. I was selected and attended two periods of extra mural studies at University College, Oxford, in management and industrial relations. I met some wonderful people there. People from outside mining and it certainly broadened my horizons. Walking through the meadows of ChristChurch and boating on the Isis River was certainly much different from the black holes underground in No. 5 Area. The educational experience I gained at Oxford no doubt stood me in good stead in my mining career. Just before I was appointed to my first undermanager's job at Denby Drury Lowe, I finally attended a course for young mining engineers from all over the country at the University of South Wales in Cardiff. A most satisfying experience to begin my mining career in management. I was 25 years of age.

7. FIRST UNDERMANAGER'S JOB - DENBY DRURY LANE, 1951

A. I was then sent to Denby Drury Lowe Colliery - old Denby - I was assistant undermanager to Cyril Richards. Remember Cyril Richards? A rogue and vagabond he was. He never went down the pit. That's another story. It was the most antiquated pit I'd ever seen in my life. I was sent there by Crossland again. He gave me that title of assistant undermanager to get me there, no more money. They were going to install a Meco Moore at Old Denby. It was shunted in the big shunt next to the pit bottom. So I went and had a good look around the pit. Their means of main haulage transport was a steam engine on the surface.

Q. This was a drift mine I presume?

A. No, shafts.

Q. You had ropes going down the shafts?

A. Ropes going down the shaft. Right the way in, it must have been about 2-1/2 miles. And it was all brick lined. This main roadway. Lovely roadway, beautiful roadway. Super. All brick lined. Because they owned the brick works as well under private enterprise. That was good, and after you left that it was an absolute abortion, I'm not joking. They didn't know what a line on the face was, they were working in the Blackshale seam and in the Ashgate which was about 2 foot 10". In order to hold the roof up, they had no chocks, never saw a chock, they used to leave bays, the Blackshale was about a 5 foot seam and they used to take out so much coal, about 3 feet. Then they used to go back and bring the lot out. They used to bridge like that, to hold the roof up. And the faces were like corkscrews, the belts were all riding up, always breaking, and they never filled off. I went to the undermanager and said first of all, "Do you realize that the faces are not straight?" And he says, "Ohh." And I said, "You're never going to get any coal like that. There's no way you're going to install a Meco Moore in any face I've seen. You're wasting your time." The manager, he was nearly 70, had a bad heart. I went on holiday and when I came back he was dead. He had a heart attack. He never came down in the pit while I was there. He was a nice enough old man, and Cyril Richards, the undermanager, was made manager. This was in '51. He was made manager and I was made acting undermanager and after a short period I got the undermanager's position. Our father went daft. He said you're sent into the most gaseous, the worst and oldest pit in the area. He went to see Wilf Crossland. He said, "You should never have sent him there, you shouldn't have sent our Jim there, it's the worst place you could have sent him." And Crossland said, "It will sort him out." Anyhow, the first thing I did was to get the surveyor down and survey every face - we had 5 faces - put it on a bit of paper and see what it was like. It was like a corkscrew. So all I did was to get a ruler, put it across and find out what the best line was and just start from there and plot it each day. What we'd taken off, what we left on, and finally we got the faces straight. The coal started to come. Then how to get the lines on. I finished up by getting shotfirers to flip a line on after the shift had finished and paid them half a crown each for putting the face line on.

Q. With a chalked string?

A. That's right. Now, the next problem was we were only getting half the coal. Because they were leaving up all these coal bays on the face. And I talked to the men - "Oh, Gaffer, take them down and we'll never coal." I said, "That's because there is nothing at the back of you. There aren't any chocks." "What's chocks?" So I started off first of all with wooden chocks - again going way back in my experience, we were using half bricks and getting through. And then I brought "Waltons" in, who made chocks, steel chocks with releases on top that you released with a hammer, and pulled them forward.

Q. These were sort of wedge devices?

A. That's right. There was a little catch that was knocked off, then slipped down. And the OMS, Output per Manshift, at Denby Drury Lowe when I went was 24 cwt per man, it was the lowest in the area, and in 12 months it was 40 cwt per man. Still hand filling. The Meco Moore never went in because they wanted it somewhere else and I was pleased because they were fairly near the surface with the Blackshale and I don't think it would have worked. I don't think that the stable holes would have stood up anyhow. And I was there for 2-1/2 years as undermanager with no face mechanization. Cyril Richards moved on to be manager of Denby Hall. He got a promotion for the output coming up and the productivity coming up - and he never came down the pit! And a chap called Fergie McNeil became manager, a young chap. A bit of a character. Anyhow, then came the annual review. My wage then as undermanager was £915 a year, that was my salary, plus free coal, light and rent and rates. And when the annual review came I got nothing. You had an annual review every Christmas. I got a bit the first year when Richards was there. The second year there was nothing, so I went to Fergie and I said, "Why haven't I had a review then?" He said, "I don't know, Mr. Crossland does these things." And I said, "Well surely he must have asked you." "He didn't say ought to me." He said, "You've done a marvellous job, Jim." He said, "It's all down to you." I said, "I've earned it more than Richards, haven't I?" He said, "You have, yes. I have nothing against you." He said, "He's coming tomorrow." I says, "Well, can I come down and see him?" And he said, "Yes, I'll tell him you're coming." And I went in and I just said, "Why have I been overlooked in the annual review?" And he says, "Because you're getting as much as you're worth." I says, "What?" And he says, "Yes, you've got a good manager here." I said, "Hasn't the manager told you what my work is like?" He says, "I don't have to ask." So I said, "If that's it, I want to see the Area Production Manager" who was then Norman Siddall. I said, "I'm dissatisfied with that answer, Mr. Crossland." And he said, "Well, you're not seeing him." And I said, "I am." I went over his head.

He made my life a misery after that. I think one of the reasons was that he was very well in with the unions and I found the secretary of the local branch of NACODS, a man called Joe Burgoyne, incompetent. I went down a heading and he had got six shots rammed and there was at least 3-1/2% of gas in the back of the heading. I sent him out of the pit, and told him he would never fire anymore shots while I was undermanager. I think they were a bit pally, but that's another story. It was just one of those things. I could relate lots of things that happened. Anyhow, I went to see Siddall and he said, "Well, I'll have a chat to Mr. Crossland." I thought, 'I'm going to get out of here.' And I saw a job advertised in Leicestershire. Undermanager at Ellistown.

Q. So you never had any of the incoming modern mechanization at all at Denby Drury Lowe?

A. No, none at all, but I put the pit right on hand filling. It was a gassy pit, too. In fact I better tell you this, you will be interested. One Sunday night the mine got gassed out. Again, this was Crossland, we had a booster fan in the main return. It had been put in years and years ago. It was so far out. And he wanted this booster fan for Moorgreen Colliery. And I said, "You will have a problem if you take that booster fan out." McNeil said, "Well we're having a survey done by the area safety officer, Dr. Somebody." And he came and did all this ventilation survey and he said the booster fan could come out, it would be all right. Well they took the booster fan out. There was a sudden drop in barometric pressure one Sunday night and we found the pit full of gas, full of methane. We couldn't get down the shafts. Couldn't get down the upcast shaft. We had a little drift out at Flamstead near Denby Village, put down for another intake. Norman Siddall, the area production manager, sent for Prof. Hinsley from Nottingham University. He did all the exercises, all the calculations, and advised us to make Flamstead drift, which was an adit, into the Blackshale as the upcast, and to install an extractor fan and make both the shafts intakes. That put the ventilation right.

Anyway, the pit was off for a month. And Siddall and Unsworth came. Unsworth was the AGM. Unsworth said to me, "Jimmy, what the hell's going on? Why has this happened, has there been a big fall or something?" And I said, "No, it's because we've taken the booster fan out." "What booster fan?" I told him. "You better go get yourself bathed," he said. And again, I think Crossland was hauled over the coals for that. This is another story but that's the sort of chap he was. And after that, of course, he fell foul of our father and when I left and came to Leicestershire, he got on to our dad. And that's why Dad and you, Malcolm, came across here to Leicestershire. So, I decided I was going to have something fresh - my ambition was still to be a colliery manager. I looked around the colliery managers in the No. 5 Area - they were all fairly young - and I couldn't see me ever getting a manager's job while Crossland was sub-area manager.

8. EARLY ORGANISATION OF THE NATIONAL COAL BOARD

Q. Interrupting here, Jim, you've been using a lot of terms that - I know what they mean because they are National Coal Board terms - areas and AGMs and so on. It might be useful just to take a couple of minutes and describe the organisation of the National Coal Board as it first was. How they made the change from private companies to an enormous single entity, how it was divided into regions.

A. O.K., well the mines were nationalized in 1947. Before that they were all split up into small companies up and down the country. Some were bigger than others.

Q. There were thousands of mines weren't there, at the time?

A. Oh yes, but a lot of them were what I would term holes in the ground. Some of the larger companies such as the Butterley Company, for one, was very very far seeing, they were way in front of their time, with the face conveying and gate conveying. Good support systems. Other mining companies were just horrible. Anyhow, in nationalization they decided to form the country into divisions; there was the Scottish Division, a Northern Division, there was an East Midlands Division, Yorkshire Division, Kent Division, South Wales Division, that's more or less what it was. And from the divisions - oh, first of all there was a National Board as such, but really it was the Divisions who ran themselves. They were not integrated like they are now as a national organisation. They were autonomous to themselves, they ran their own thing. They only reported back to the National Coal Board as regards to the targets they were set and allocation of capital. Each division was on its own and ran itself. And within the divisions they had areas. In the East Midlands Division where I worked and where you worked as well, they had Number one area, Number 2, 3, 4, 5, 6, 7 and 8. They had eight areas originally. That came down eventually. Each area was headed by what they termed an Area General Manager. Next in line was an Area Production Manager who was in charge of all the production and planning of the area. I'll just take that line first, down to the pits. The Area General Manager was in overall control of the area, not just the pits, but estates, farms at that time, all of those things, administration, the whole lot. He reported to the Divisional Board.

Q. Were all the Area General Managers mining engineers?

A. Mining engineers. They had to be mining engineers, appointed as owners under the Coal Mines Act.

Q. So all this line that you're speaking of were all mining engineers.

A. All mining engineers. As I said, there was an Area General Manager who was in control not only of the coal but all the ancillaries as well. He had under him an Area Production Manager who was in charge of the area as regards to coal production. The area was divided then into the term sub-areas with about 3 mines up to, probably, 5 mines under a sub-area manager. He had his own staff, mechanization, strata control, ventilation, safety, etc. All the colliery managers were responsible to the sub-area manager. Each individual mine had a colliery manager and an undermanager - in some of the large mines you had 2 undermanagers - they split the mine into two. The manager had his own surveyor, his own admin. officer, electrical and mechanical engineers. That was about it. That was more or less the staff on nationalization. And then of course under the undermanager you had overmen, deputies and shotfirers, so that, basically, was the area organisation right down to the colliery manager, then through the colliery organisation, right down to the shotfirer.

Q. What was the attitude of the management, pre-nationalization colliery managers and undermanagers, toward the whole idea of nationalization?

A. It was mixed. Most of them had shares in their own company because that was part of their agreement, they had shares in the company. They were not very friendly towards it initially.

Q. Weren't they recompensed?

A. They were but it took a long time, it took 10 years to get compensation. Some of them - the older faction were not at all endeared to change. You could see that change was coming with mechanization, they didn't like it - Herbert Johnson never wanted a machine in Ellistown. And Fred Burdett, at Nailstone. No way, this was hand filling. They were o.k., they were making a profit and they did, they made a profit. Why should they change it? So there was that element. You then had other people coming up like myself. Our father was older, but he was mechanization minded, Sam McKee of Desford, he was all for mechanization, he was all for going forward. So you got a mixture. Peter Richardson at New Lount, he was for hand filling, no change. Bill Hall, other than the Samsom Stripper - all hand filling in his pit. Neath at South Leicester wouldn't have a machine in his pit. So there was that mixture, but gradually that went as the new mining engineers came forward, we could see what was happening, we wanted to see something new. Then it started to change. But initially there was a certain amount of resentment because they had a vested interest and did not like change.

Q. What about the work force?

A. Oh, the work force in the East Midlands Division were with it 100% and wanted to go forward and wanted to do better. No doubt about it at all. Different to other parts of the country - a la South Wales and Scotland, they didn't want change at all! But certainly round the Midlands, Malcolm, oh yes.

I think you'd better switch it off and we'll have another drink. I'm getting a bit hoarse. I'm talking too much. I shall want two pints tonight!

Q. We're making you work hard today.

A. That's on record.

9. THE MOVE TO LEICESTERSHIRE, UNDERMANAGER AT ELLISTOWN, 1953

Q. Yesterday we'd got through your early days of management in Denby Drury Lowe. You were assistant undermanager and then you became undermanager there. And you had decided to move out of the area. Take it from that time. How did you come to choose Leicestershire? What was the background to coming here?

A. Well, I saw an advert in the local circular that went round to all the East Midlands Areas when vacancies arose. There was a vacancy for an undermanager at Ellistown Colliery - Leicestershire. I looked in the Guide to the Coalfields and noted all the colliery managers in Leicestershire. The numbers of the certificates indicated to me that they were all getting on a bit. So, again, being a little bit disoriented with the management setup that I found in Area 5, I decided to apply for the job. I remember well coming for my interview with Iris, Jane and Sheena, they were very small. Iris was expecting Heather at the time as well. We came into Ashby and then I went to Coleorton Hall and had a very successful interview. I was asked at the interview whether I would go if I was offered the job. I said yes. Then the letter came through to Area 5 Headquarters that I was being offered the job, for this was the setup, they always had to notify the area where you worked. I was sent for again by Norman Siddall, and Unsworth was there as well, he was the Area General Manager. Unsworth had already worked in Number 7 Area which is South Derbyshire, he had been manager of Donisthorpe and then Sub Area Manager, and he said, "Look, Jim, I don't think you'll get on with the setup down there, they're a very close knit, very insular lot in Leicestershire and there are very very good prospects for you here in Number 5 Area. I would advise you not to take this job." I says, "Well, Mr. Unsworth, I was asked at my interview whether, if I was offered a job, would I come, and my answer was yes and I will not go back on that." Even if he offered me something different would I have. No, I would not go back on my word. So to cut a long story short, I accepted the job. Iris and I came to look at the house, it was almost in the colliery yard, a big house, a nice old house although a bit dusty from the screens to say the least but with a very big garden and a gardener provided as well. So I settled in at Ellistown as undermanager. I expected it to have started on face mechanization, in fact they hadn't. They were rather backward. They had not got one loading machine on the face at all. It was all hand filling. But having said that, the material systems and the coal transport systems were second to none. They were all face conveyors, all thick seams, anything from about 4 feet 6" up to about 5 feet 6". All face conveyors were top loading, covered bottom pans. Gate conveyors throughout and trunk conveyors right out to the shaft bottom. They were just in the process of installing a modern circuit with mine cars in the pit bottom at that time in order to dispense with the small tubs they were using. Eventually they had 3 ton mine cars on a closed circuit underground which you will remember Malcolm. It was an excellent setup but again, as I said, there was no face mechanization. I found the Leicestershire mines absolutely second to none. The miners and the officials were first class. Iris and I said we would only stay in Leicestershire 5 years, here I am now, I was 27 years old then - here I am at 64 and I'm still in Leicestershire.

Q. What was it that had delayed face mechanization coming into Leicestershire at the same time as it did in Derbyshire?

A. It had partially started at Desford Colliery. That was the first coal face where they had just installed a Meco Moore which I'll come onto when I come to Desford. They were quite content then with the highest OMS (output per manshift) in the country, they were doing 2 tons a man where the average in the country was only round about 30 cwt. They were making a profit and they just had not looked at it, but it came rather quickly after that.

Q. Was there anything in the geological conditions that made it less suitable?

A. None whatsoever. It was crying out for it. I think when I look back now, the Sub Area Manager was old, he was about 67, and the manager of the pit was getting on a bit as well. I think they were just satisfied with what they'd got. They didn't want change. As I spoke about before, in private enterprise days they probably had shares in the company anyhow and they were just quite happy to continue on as they were. It didn't happen until we started to get the younger breed of mining engineer. We were reading about new techniques, went to look at new developments, and it may well be that was the reason I got the job, because I mentioned that face mechanization was taking place in Number 5 Area. The Area General Manager called J. J. Torrance was quite obviously very interested in face mechanization. And that may well be why I was offered the job. A young one coming in with new ideas. And this was so, this did happen. Anyhow, I wasn't long at Ellistown because inside 12 months a vacancy arose for the manager's job at Desford colliery and I just thought, well, I'll put an application in, I don't expect even to get an interview. I applied for the job and I was interviewed and much to my astonishment, because then I was only 28 years of age, I was offered the manager's job at Desford Colliery in 1954.

10. MANAGER AT DESFORD COLLIERY, 1954

Q. Desford was a large mine wasn't it?

A. That was a large mine. There were two mines combined. Desford Colliery as such and a drift called Merry Lees on the extremity of the coal measures, and there was only one manager. There were 3 undermanagers, one at Merry Lees, there were 2 pits at Desford, number 1 pit and number 3 pit, and there was an undermanager in each pit. It turned just over a million tons a year. But at these large mines, in addition to having the manager and sub area manager, they had in between what was termed an agent who looked after the capital and new projects. He was senior to the manager of the mine although he had not got the statutory responsibility that the manager of the mine had. But at very large mines, and this was true throughout the country, they had agents, and so at Desford there was an agent in between myself and the sub area manager.

Q. Do you remember the names of the agent and the Sub Area Manager?

A. Sam McKee was the agent and the sub area manager was Rutherford. I will always remember, on my first day at Desford, I stood in the middle of the big pit yard and I looked round and said, "I've done it, I've arrived, I am now manager of a coal mine. I've reached the height of my ambition. This is it."

Anyhow, in 12 months time there was a reorganisation of the National Coal Board. They had a chap called Dr. Fleck who made a full report to the ministry on the area organisations and colliery organisations. They dispensed with agents and dispensed with sub area managers and they formed groups. Virtually it was the same job as a sub area manager, and what they did then was split Desford and Merry Lees collieries away from each other and appointed a manager at Merry Lees. In those days they used to switch managers around fairly regularly. And I transferred to Bagworth Colliery as manager. Virtually about the same size as Desford - Desford on its own - but there was no agent.

Q. So you were only at Desford for 1 year?

A. About a year, that's right. 12 months. And Rutherford retired. He was 67 and Sam McKee became the group manager over Ellistown, Nailstone, Bagworth, Desford and Merry Lees. So then I became manager of Bagworth. And I found again exactly the same system. Oh, I'm overrunning my story and this is important. Let's come back to Desford and Merry Lees. As I said, when I got there it was all hand filling except for one face where they had a Meco Moore. And that was at Desford. But again, the same problems as we had in Area 5, large machine, large stable holes, not very good roof conditions in the stable holes, but it was mechanically loading coal and cutting coal.

Q. Was this the only one of its kind in the area?

A. That was the only one they had, yes. That was the only Meco Moore they had.

Q. So it was experimental as far as this area was concerned?

A. That's right. But at Merry Lees - the Anderton shearer loader had just been developed in Lancashire. Sam McKee and I went to Lancashire, to Bold Colliery to see the first one with a German Westfalia armoured conveyor. And we were so impressed that we came back and made our case out to have a go at an Anderton shearer and armoured face conveyor and this was installed in Merry Lees. It was again just an ordinary coal cutter but with a disc on the face side going into a buttock and cutting and loading the coal. I could see that even though it produced a lot more small coal than the trepanner, it was quite obvious to me that this was going to be much more flexible.

Q. What year would this be?

A. This was 1954-55. Our greatest difficulty with it was the cleaning up behind because it left a lot of small coal. We tried ploughs, we tried all sorts of things. We had to have men go on the face side to shovel coal because it was a one ended machine and you could not snake the conveyor until you had virtually cleaned up. We then did not turn the machine around, we didn't because we flitted it back using a plough, leaving the conveyor back, and the exposed roof unsupported.

Q. You had to plough on the way back?

A. Not at first. We hadn't developed it yet, it came later, as I said. It was men with shovels and it was quite obvious to me that it was dangerous, men working on the face side. Another thing as well, we also had no facilities for snaking the conveyor. Instead of the ringers that I spoke about at Lodge Colliery, we had hand jacks but the conveyor was so heavy that we bent the swords of the jacks. We finished up by installing a compressor in each gate, and using compressed air jacks and that solved one problem. We cut and loaded very successfully for about 3 months until the mechanics of the machine went bust, you know it was a prototype. But it was quite obvious to me and to the powers that be that we were really on to something and at the same time of course they were developing the Anderton shearer in Lancashire but that was the first one in the area. Also, in addition, I soon discovered to my cost that the Lower Main seam at the Merry Lees end of the mine was very liable to spontaneous combustion. We had a lot of coal fires there. In fact we had one where we had to clear all of the mine. The mine was off for 3 days. But these things do happen and of course in those days we hadn't got any injection techniques, not at all, we just put on stoppings and sealed the face off. I thought I'd mention that, Malcolm, because that was the first Anderton shearer which came in and I was manager of the mine where it was installed.

Q. Tell me more about the face support system at the time this first shearer was installed.

A. It was just ordinary props and bars, steel props and bars, rigid steel props and bars. We had them for a start but by then the Dowty prop was coming out, and we did, before the shearer came off the face, install all Dowty props throughout. That was a big help too.

Q. So this was the first time you used hydraulic supports?

A. Yes.

Q. They were all single hand set?

A. Yes, you pumped them up with a key. There was another development as well at Desford which may be of interest. Sam McKee and one of the safety officers, a chap called Matt Smith, he was a safety engineer, were experimenting and dabbling about with a hydraulic chock. It was called the Desford chock and it worked off the fire fighting system. They built three and they were on trial at Desford Colliery. And again, that became our most successful attempt on self-advancing supports latterly.

Q. It worked off the fire fighting system?

A. It worked off the rising main onto the fire fighting system. That was the pressure, that's what pumped the chock up. You used a snap coupling, pushed it into the chock and then went on to the next. We had no pressure relief valves on it, it was just two cylinders with a canopy on it and some valves in it and it just went up, and of course water is incompressible and it held the roof up. But there was no sort of relief valve. That was the first so called hydraulic chock I saw, the Desford chock. That of course was followed by the Gullick, they were developed on a box frame, with 4 Dowty props, one on each corner of the frame. The Desford chock was the first one which I really saw where I could see real potential once it got going. I could envisage we could have rows of these and attached on to the conveyor with rams as well, and they would push the conveyor forward, this did happen, this is what was coming. As I saw it, this is where it was going to be eventually.

Q. So how many of these chocks did you use on the face?

A. We had three on test at that time when I left. In fact, I believe they were made at Tube Caterpillar Works in Desford itself. Out towards Enderby, that's where they were made. They were just an inner and outer tube filled with water, with a small canopy over the top and that was it.

Q. Did they just continue to accept the weight until - there was a hand relief valve presumably?

A. That's right, a pressure relief valve was fitted eventually.

11. MANAGER AT BAGWORTH COLLIERY, 1955

Q. O.K., so then you went to Bagworth?

A. Yes, then I became manager at Bagworth. Again, it was hand filling, all face conveyors, two mines, Number 1 and Number 2, or top pit and bottom pit as they called them. I must say this, there were pit head baths at Ellistown, there were pit head baths at Desford and Merry Lees, but there were no pit head baths at Bagworth. They were just building them when I got there, and it was very similar to Ellistown, was Bagworth. All hand filling. The same trunk conveying system. Antiquated shaft bottom, tubs still going, and getting the coal up the shaft was a real problem. So my mind was bent then, not to mechanise faces because there was no point in mechanising faces to increase the output when I couldn't raise the output I was getting now. The shaft capacity wasn't adequate, there were small tubs, and the shafts weren't big enough to increase the tub size. So I started to think around the problem. The only thing I could see which we could do - because large mine cars wouldn't go in the cages because the shafts were not big enough as I have just said - I looked at skip winding, small skips. I went to see one or two installations throughout the country. And then I started to get some ideas together with area people. Finally it was decided that we were going to put in skips at Bagworth and that is just what we did. So I was at Bagworth for 3 years, just under 3 years, and during that time all my attention was given to streamlining the coal transport system.

Q. Did you look at sinking a bigger shaft or a drift?

A. No, I don't think I'd have had the money for that sort of thing. Interesting story by the way about Bagworth, because I was nearly sacked by J. J. Torrance. I looked at the shaft section and I saw the workings above. They were working the bottom seams which were the Lower Main and Yard seams, and there were some marvellous seams above us. There was a 5 feet and Splint which came together and gave 9-10 feet of coal, the Minge Seam of very high quality of about 6 feet and I remember saying to the manager of Ellistown, Johnson (who was manager at Bagworth before he went to Ellistown), "Why haven't you touched these upper seams?" Because there were the same seams at Ellistown. And he said to me, "Don't ever go up there, you'll get flooded, you're near the new red sandstone, these seams will never be worked." Now in my youthful exuberance without asking any permission at all, I made an entry in the shaft side into the Minge Seam. It was 6 feet thick - lovely coal, and I put a coal cutter in and made a bit of a run-round in it to bore the seam. Then one day I got a phone call from the area general manager's secretary. Sam McKee let me down because he knew all about it, I spoke to him about it. Anyhow, "I want to see you in my office. Where are you now?" I said, "I'm just going down the pit." "Are you changed?" "Yes." "Well get changed back into your clothes. I want to see you in my office immediately." He said Mr. McKee will be there and Mr. Butterley, the area production manager. So I went to Coleorton Hall and there sat J. J. Torrance, a quiet spoken man, who never raised his voice. His son is the local doctor. And Sam McKee and Andy Butterley. He said - he always called me by Mr. McPherson, he never called me by my Christian name, he never called any manager by their Christian names, never, it was always mister. That was different from No. 5 Area. But that was the form. He was the area general manager and he called all his managers by mister. Anyhow, so he said, "Sit down Mr. McPherson. I expect you're wondering why I've sent for you and why I have your colleagues around here." And I said, "Yes, I am wondering, Mr. Torrance." And he said, "Well, it's a rather serious state of affairs, young man. I understand, it has come to my notice that you have made an inset in the shaft at Bagworth Colliery, the Number 1 shaft in the Minge Seam." I said, "Oh yes, yes I have. It's a wonderful seam." He said, "I know it's a wonderful seam, Mr. McPherson. How did you make the drivage on the shaft?" "I took a coal cutter in and a boring machine." "Oh, that's very interesting. Electric?" "Yes." "Well, Mr. McPherson, did you apply to the Inspectorate to enter into a new seam under the Mines and Quarries Act?" I said, "No, Mr. Torrance ." He said, "Did you apply to the Inspectorate for the introduction of electricity into a new seam under the Mines and Quarries Act?" And I said, "No, Mr. Torrance." He said, "Did you do this off your own bat?" I've always been loyal to my superiors and Sam McKee sat there. And I said, "Yes, Mr. Torrance, off my own bat. I wanted to see these new seams and if they could be face mechanized." He said, "Well, young man, you could be prosecuted by the Inspectorate." I said, "I did not think about that." He said, "Obviously, you're youthful and you want to get ahead. I will overlook this at this time but if you ever do anything like that again, you will never again work for me or in my area." I said, "Thank you very much sir." And I walked out with my tail between my legs. Anyhow, I was there 3 years and again with the usual sort of shunts around, they had a shunt round again of managers and I finished up at Nailstone.

Q. Tell us about the skips. Were those installed successfully?

A. Yes, they were only small skips, 2-1/2 ton capacity, designed and made by Qualter Hall in Barnsley. I went up there when they were being built.

Q. Skips were quite new at that time, weren't they, in coal mining?

A. Yes they were, but we had to have ours specially designed to fit the shafts.

Q. How big were the shafts, do you remember?

A. Where the skips went the shaft was 12 feet in diameter.

Q. You were coal winding in one shaft?

A. No, we were coal winding in both shafts. We had to do to get the output up. Upcast and downcast.

Q. So coal was coming through an airlock?

A. That's right, in one shaft, the upcast. They were both coal winding shafts. Antiquated run arounds and intensive in labour.

Q. Did you have any problems with the skips within the shafts - the stability of them?

A. No, we had teething problems, unloading. Getting the skip doors up to unload. We had mechanical interlocks, which did not always work. We had to install compressors on the pit top to power operate the skip doors. That was one thing that we didn't envisage. But apart from the usual teething troubles they worked wonderfully well.

Q. So the shaft bottom conveyors loaded directly into the skips?

A. Directly into the skip hopper. And one man in a cabin in the pit bottom operated the lot and one man on the surface. It saved a tremendous amount of man power. And of course it gave us shaft capacity.

Q. And that eliminated the need for mine cars or tubs.

A. That's right.

Q. So did that relieve the coal transportation to the extent that you could turn your mind to face mechanization?

A. That's right, I had just started to look at that. I had one face earmarked in the Middle Lount Seam. I was going to put a shearer in when I was transferred to Nailstone. At Nailstone they had just installed one mechanized face. The manager who I replaced at Nailstone was John Northard. He is now Deputy Chairman of the National Coal Board.

During my three years at Bagworth I was privileged to be elected President of the South Midlands Branch of the National Association of Colliery Managers. I was the youngest President in the U.K. I mention this because I had a wonderful opportunity during my 12 months in office of organising technical papers and visiting other collieries and discussing with eminent mining engineers all the new techniques taking place. This stood me in good stead in the years to come, and broadened my thinking.

12. MANAGER AT NAILSTONE COLLIERY, 1957

Q. There was a shearer in Nailstone when you arrived?

A. It was a shearer, yes. It was a single ended shearer with an armoured face conveyor.

Q. Were these all German face conveyors?

A. These were Westfalia. We found them to be the best. We then made them under licence eventually in this country. But the German Westfalia Panzer conveyor as it was called, that's why it's always been called a Panzer, they were heavy duty and were really very robust.

Q. So we're now talking about 1957-58?

A. We're talking 1957-58, yes.

Q. What was the situation with the face support systems three years after the Dowty individual props were introduced.

A. Very quickly, inside two years, most of our faces had got hydraulic props on. In fact by the time I went to Nailstone all faces had hydraulic props on them.

Q. They were still single props rather than chocks?

A. Props and bars.

Q. So at this stage we had the shearer, we had the armoured face conveyor but still not the self-advancing supports.

A. There was a period in between that, although they were starting to experiment with Desford chocks and with the four leg Gullick chock which virtually was just a steel frame in locations with 4 Dowty props and a canopy over the top. There was a face trial of them going on up in Lancashire somewhere. I didn't see that testing at all. But, interestingly, when I got to Nailstone they were just bringing out the link bar system where you link bars on. Again I think the initial one of those was German too.

Q. Can you describe that system?

A. They were about a metre each and you linked them on rather than having to have adjacent bars and lead forward on a double row, you linked extra bars onto a linkage instead for support and we found that was quicker and certainly not as time consuming, and easier for the men because they didn't have to lift up these heavy bars all the while. And these were on this first shearer face when I went to Nailstone. Again, it was a single ended shearer with a rope haulage but it was on a capstan and the rope went right through the face anchored at either end.

Q. Was that the first time that system had been used?

A. The first time I saw that, yes.

Q. Where was the rope physically? Nowadays it would be part of or very close to the conveyor.

A. It was on the face side.

Q. But it was free standing from the conveyor?

A. Yes, that's right. Sometimes it went across the conveyor. It went round like an endless rope haulage in fact. Round the capstan of the shearer. It was anchored and tensioned at either end.

Q. The face would be how long at this time?

A. That face was 120 metres long.

Q. Did that give rise to any problems - this was a very long rope compared to the 20 or 30 feet of the old coal cutters.

A. It was continually breaking, that was the trouble. We didn't know what the correct tension was. As soon as the machine started to move we stopped applying tension. And then when the machine stalled we applied more tension on the rope. There were so many breakages it was unbelievable. Obviously we had to get something else. And, of course, what followed in quick order was chain haulage throughout the face. That followed fairly quickly because obviously with a wire rope going all the way through the face it was getting damaged and it was breaking. It was causing no end of hold-ups and lots of output.

Q. Did that happen while you were at Nailstone?

A. We did install one other face while I was there and we had chain haulage on that. Nailstone pit, again, was living in the past. The transport system was antiquated. Very antiquated, small diameter shafts, could not increase the output.

Q. Similar problems as at Bagworth by the sound of it?

A. It was even more antiquated than Bagworth because there was one winding engine which had the power for both shafts although the shafts were staggered.

Q. One winding engine for both shafts?

A. Yes.

Q. They had one winding engine then that supplied the power for hoisting in both shafts. So winding in the two shafts had to be phased in some way?

A. No, the shafts were so small, there was only one cage in each shaft. And there's one interesting thing as well, obviously the next question you'll ask me is what about ventilation? Well the ventilation - the upcast shaft was a bonnet, had a steel lid if you like on top of the shaft and when the cage come through, this bonnet went up, acting like a bellows all the while on the ventilation. You could sit in a district in Nailstone Colliery and the ventilation would reverse itself as you sat there because of the winding taking place. Obviously something had to be done because we had just developed into the Lower Main Seam which again was liable to spontaneous combustion and with this sort of suction effect backwards and forwards, we were getting very serious problems with gob fires. And in point of fact we had one serious fire and lost the face. It was decided that until we did something with the ventilation we were not going to develop any further in that seam.

13. DRIVING THE NAILSTONE DRIFT, 1958, AND IMPROVEMENTS TO FACE EQUIPMENT

A. We had a lot of trouble with ventilation, and after a series of meetings we decided that we were going to drive a surface drift at Nailstone.

Q. When did that get started?

A. That started in, I think I'd been there probably 12 months when we laid out plans and we started to drive the surface drift.

Q. So that would be about 1958?

A. We started driving the drift at the beginning of 1958. The overall length from the surface to the existing underground workings was just over 500 meters dipping at 1 in 4. The drivage took place simultaneously from either end, i.e. the surface and the existing underground workings. The entire drivage including the installation of the drift conveyor was completed in 12 months. It is of interest to note that we drove through the New Red Sandstone (the "Red Measures" we called them) from the surface end, and although we had water it was not under pressure. That made very difficult working conditions, but not dangerous. Although all the shafts in the Leicestershire coal field had passed through the "Red Measures", it was only the second time that a roadway had been driven through, the other one being the Merry Lees drift. It was also noted that the quantity of water at Nailstone was far less than at Merry Lees. I mention this because it becomes very important many years later, when we begin to work the upper seams.

Q. This surface drift was for both coal clearance and also for ventilation?

A. The surface drift was going to become the downcast. Meanwhile we were also driving a drift and a roadway to connect Nailstone colliery underground with Bagworth.

Q. How far apart were they, the two mines on the surface?

A. The shafts would be about a mile and a half.

Q. So the new drift was going to alleviate ...

A. Connect into existing roadways in both mines and the plan was to fill in both Nailstone shafts and upcast at Bagworth.

Q. And all the coal from the two mines would come out the drift.

A. Well that happened eventually. Originally they were still under separate management and only Nailstone coal came up the drift. But eventually - I will tell you about it because I was involved in that many many years later.

Q. So at this stage then in 1958 you had two mechanized faces, at Nailstone.

A. No, we had only one, still, because there was no point in doing anymore because of the shaft capacity and ventilation until we got the drift going.

Q. The drift was completed one year later.

A. That's right. Meanwhile they were really fast developing the Gullick support and they'd also developed the trepanner as well as I had envisaged many years earlier. They had now made it into a double ended trepanner with a wheel at either end so you didn't have to turn it around when you got to the other end. You only had to have a space in order to push it forward with the length of the trepanner itself. So after the drift was completed then we earmarked to develop and install an armoured face conveyor with 4 leg Gullick chocks (we had not added the 5th leg then) and a double ended trepanner with a chain haulage.

Q. What was the salient point that distinguished the performance of the trepanner against the shearer. Were these two machines in competition at that time?

A. Yes they were.

Q. Different manufacturers?

A. No, the same manufacturers because Anderson Boyes had now got a licence to produce the shearer. The shearer was a more universal machine, more simple mechanically. The only problem with the shearer was that it produced a lot of small coal. In those days we still had railways running and we had a big house coal demand, the generation of power from coal was starting to increase but it hadn't got to the stage where it is now, although it is again declining. So we really wanted large coal as well. So there was a mixture of Anderton shearers or shearing machines and trepanners in the area. It was a marketing problem that controlled it. In fact, at one stage, we had to curtail the introduction of face mechanization because of marketing needs for large coal.

Q. And the trepanner produced that large coal for you?

A. Yes it did.

Q. So that was a deciding point.

A. Yes.

Q. So you had the second - first of all you had a shearer system in Nailstone, then that was replaced by a trepanner face after the surface drift was completed, is that right?

A. That's correct. In fact, I have a photograph showing the first Gullick chock being delivered to Nailstone colliery.

Q. And these Gullick chocks had the horizontal jacks to push over the conveyor.

A. Yes they had. That was the first time. That was an integral part.

Q. Tell us about the Gullick System. How it was powered. How the power was transmitted. How it was operated.

A. Well, initially it was oil, soluble oil, but you had to have a big tank, it had to be under pressure. We had numerous leaks on it. It was messy and of course it was dangerous from a fire point of view. It was quite obvious that we had to do something about it. In fact there was a special committee set up in London, a national committee to investigate this problem, and finally they came out using water with an emulsion added to it. And that really transformed the whole hydraulic system. And that's what we've got today in fact.

Q. A white milky fluid.

A. That's right. We had an emulsion, but it was water based and we were able to use much lighter tanks in the roadway. It was cleaner, we didn't have many leaks at all, through valve seatings. With the oil, the chocks sometimes used to unload themselves.

Q. The hydraulic pressure was produced by a power pack, a pump situated in the gateroad with hydraulic hoses running up the face. This was also new at that time?

A. That's right.

Q. Before that, it was simply four props inside a frame.

A. That's right.

Q. Did you have any teething problems with this? Leaky hoses or burst pipes?

A. We didn't. At Nailstone the first installation was on oil. We didn't have water and emulsion then. That came afterwards. Fairly quickly afterward because we could see that there was a great health hazard to this - not only from a fire point of view but people were getting skin rashes and all sorts of things wrong with them. It was quite obvious that we had to stop and do something else. And this is why there was a special committee set up to go into this. The water emulsion is what they came up with and it's still there today. Anyhow, once we got the face going, it produced well apart from the supports and the oil problem with the supports. It performed exceptionally well and we got large coal and with the drift coming into operation we increased the output. Nailstone mine was breaking all records by this time. The group manager who was called W. C. Statham, you remember him, Malcolm, retired and John Northard, who was agent/manager at Rawdon in South Derbys, was promoted to group manager in Leicestershire.

14. MANAGER AT RAWDON COLLIERY, 1963

A. Rawdon Colliery was the largest mine in the area. The job became vacant. I didn't apply for it because I could see that one day, probably quite soon, Bagsworth and Nailstone would combine, forming a very large complex, and besides, I wanted to stay in Leicestershire.

Q. This was the manager's job at Rawdon?

A. General Manager's job at Rawdon - no, agent manager, general manager's came later. At large mines they were called agent managers and got a higher grade, there was a difference of salary from an ordinary colliery manager because of the size of the enterprise. I didn't apply for it because, as I have already said, I could see what was going to happen at Bagworth and Nailstone. The surface drift conveyor was only half full of coal all the while and to me it was obvious that we should take the skips out at Bagworth - we'd already got a roadway through, install conveyors and surge bunkers and bring all the coal up Nailstone drift with a central washery plant. The manpower saving would be substantial. Quite obviously this was going to happen. So I didn't apply for the Rawdon job and I was sent for by Bill Unsworth - J. J. Torrance had retired and Unsworth was transferred from Number 5 Area into then Number 7 Area. Number 8 Area was Derbyshire and Number 7 Area was Leicestershire. So they amalgamated them both into Number 7 Area and Bill Unsworth became the area general manager of the New Area. He was the chap who told me not to come into Leicestershire because I wouldn't fit in. Anyhow, he sent for me. It was only the second time in all these years I'd been sent for by the area general manager. I thought, 'What have I done wrong this time?' He was by himself - this was different. He said, "Sit down, Jim, my lad." I sat down. He said, "I'm a little bit perturbed about you." I said, "What have I done wrong Mr. Unsworth?" He says, "You haven't done anything wrong, it's what you haven't done." I said, "What do you mean, haven't done?" He said, "You haven't applied for this large mine that I've got in South Derbyshire, Rawdon, agent manager, more money. How long have you been at Nailstone?" I said, "The last 5 years." He said, "Long enough. You've done a good job there Jim, you put down the surface drift and your output has increased, you've got high productivity and you're making money, but it's high time you spread your wings. The interview is tomorrow." I said, "Well, Mr. Unsworth, I'll be perfectly honest with you. I did think about applying but I've got a good mine where I am, I'm happy there, I can see that fairly shortly you'll join Bagworth and Nailstone together." And he said, "What gave you that idea?" I said, "Well, it sticks out like a sore thumb. That drift is adequate for, taking both mines output, they've got a washer at Nailstone second to none, they've got an antiquated screen system in Bagworth. It's quite obvious with some bunkers and conveyors installed, you've got the lot together and when that happens it's going to be under one manager." He said, "Oh, you don't know everything, it may well be combined but we may well keep it as two managers and where are you then? You're down for an interview at 10:30 in the morning. Be there." Anyway I went to the interview and next day I heard that I was going to be agent manager at Rawdon. You came there Malcolm. I had only just arrived 1963 when you came on a visit with the Junior Section of the Institute.

Q. Yes, I was just starting then.

A. I'd only just arrived a week and I didn't even know where I was. It was a huge pit. So many seams. They were mechanized. They had some face mechanization, they had a mixture of all methods.

Q. They had shearers and trepanners?

A. Shearers and trepanners and trepan shearers - that was a trepanner head at one end and a shearer disc at the other, again for large coal, but more flexibility.

Q. And that cured all the problems of having men on the face side cleaning up.

A. It certainly helped but then by that time we were developing ramp plates on the face side. As the conveyor went forward it put all the coal onto the conveyor. That was innovation. I can now speak of tremendous innovation at Rawdon that went on.

Q. Before we get into that, one of the things that the Gullick support system brought in was automating the push-over of the conveyor. This would seem to me to be the last big manual operation that was now mechanized. Before that you had to push the conveyor over with hand jacks and so on.

A. No, it wasn't the biggest innovation. The biggest innovation came after that. When we eliminated stable holes.

Q. O.K., at this stage you still had the stable holes? The question I was leading up to was the timing of moving the conveyor over. This would speed up, presumably, with the coal winning itself and had to be more carefully phased. Things were happening very much quicker. Did you have any problems getting all of these things working together - getting the face conveyor pushed over at the right time, because it was still manually operated by valves on the chocks? It must have been quite critical.

A. But it wasn't so critical once we got a snaking conveyor, it wasn't so critical to have a completely straight face. Although it was desirable because of roof control problems, but it wasn't critical to have your face completely straight. Although it is always desirable to have a straight face. So a few inches either way, didn't really matter because with a shearer it was quite easy to take a fly-cut off. And put it right fairly quickly, as against belt conveyors. Having a snaking conveyor, a straight face line, although it was very desirable, was not critical.

Q. One thing we've missed out somewhere along the way is when you started full caving and got away from the old pack system.

A. We didn't start that till we got the Gullick chocks in. The first one was at Nailstone on that face I told you about. That's when we first started full caving.

Q. Did that give any problems of additional subsidence on the surface?

A. Oh yes, because the mines in Leicestershire are fairly shallow. On the shearer face at Nailstone, we had Walton chocks staggered. We had semi caving there, about 110 to 120 metres long. Semi caving on solid chocks with releases on. It was only a 3 foot seam, the Yard seam. But obviously we did not consider even thinking about caving in any seams thicker than that unless we had hydraulic supports. The first installation was in the Middle Lount seam, 5 feet thick, at Nailstone with 4 leg Gullick chocks. It used to frighten the men to death when it first started. The roof used to go bang and creak when we moved the chocks over. They soon got accustomed to it as they gained confidence in the supports.

Q. One of the arguments against longwall systems in the United States is this question of subsidence caused by a full caving system.

A. Yes, it's the depth you work at. If you're deep enough you're all right because of the bridging effect of the strata. But it certainly is a problem when you're shallow working, no doubt about it. And this is why in Leicestershire and in South Derbyshire there was a tremendous amount of surface subsidence. Houses coming down and having to compensate and re-house people. Yes, that was a big problem, but the country wanted coal, and by that time the power stations were all going on to coal fired and they required all the coal they could get. It was a financial exercise although it did get people's backs up against us in mining. But they were compensated, and houses were rebuilt for them after it settled. Obviously the heritage places like churches and old listed buildings were not undermined, we left pillars around them, we didn't mine coal underneath them.

Q. Anyway, let's get the dates straight again.

A. I went to Rawdon in 1963.

Q. So when arrived at Rawdon you had this mixture of shearers and the trepanners and trepan shearers, how many faces would you work typically?

A. Ten.

Q. Ten faces? That's a big pit.

A. The average life for each face was 6 months. So we had a real problem of development, salvage and installation. We were always behind in replacing faces. And that was one of the real problems. John Northard told me that was the real problem at Rawdon. He hadn't solved it.

Q. So these were faces typically about 120 metres long?

A. No, they varied quite a bit, Malcolm. They varied from 200 metres to 100 metres. We were working in between old workings and faulting. Pillars had to be left for surface support, and the seams were quite heavily faulted.

Q. So this was the first of your mines that would be called fully mechanized then? Right from the face, right through the conveyor system.

A. There were two hand filled faces left when I got there, but very quickly, inside 12 months we were fully mechanized. Full faced mechanization with a mixture of Gullick supports and Desford Wild supports.

Q. What about the coal winding system at Rawdon? Was that skips?

A. They had a system of winding called the container system. It was developed by the area mechanical engineers. It was the only one of its type in the country, it was a hydraulic system, they had a lot of trouble with it. When it was working it was marvellous, but it was quite obvious that it had to be updated, it was going to cost a lot of money, we just installed skips in the shafts rather than containers.

Q. What was the difference between a skip and a container?

A. A container consisted of 4 boxes that never left the cage. They were the cage. And as one went up it was tipped at the top through hydraulic means, and one on the bottom. It was a good system but it was way in front of its time, the hydraulics all wanted renewing, it wanted redesigning. I was a skip winding man because I'd put them in at Bagworth and I managed to convince the area to install skips. Larger skips of course in the northern shaft.

Q. What are your memories of Rawdon with regards to the development of the mine?

A. Memories of Rawdon are of a very very large mine, short life faces, the accent had to be on development, quick development, quick salvage and quick installation. I'd say that the average life of a face was only 6 months because of surface support to be left and faulting, and old workings. The other one is that we were working the remnants of the Main Coal. It had been worked over 100 years previously from adjacent small collieries and they took out - it was about 12 feet thick - and they took out about 4 feet of the top, the best part of the seam. We then were mining coal underneath this. And of course in the old days they only filled with forks and when it broke through it was all slack. It was all small coal. The old men as we called them used to mine to the bottom of the seam and make little water courses, we found little roadways as well. The seam, and the old men's workings were very liable to spontaneous combustion. I have seen a face at Rawdon behind the chock line glowing, literally glowing.

Q. What were the methods for dealing with spontaneous combustion?

A. By that time we had developed hardstem.

Q. That's a gypsum based material.

A. Gypsum based material which we were able to pump into the strata, into voids, quick sealing. We also developed pressure chambers at that time as well, with Barry Lord, who was the area ventilation engineer and your friend, Peter Thorpe. We developed pressure chambers to balance the pressure across roadways and across goafs, using a small auxiliary fan. You know the system as well as I do Malcolm. When you thought about it, it was so darn simple. In fact, I can remember going way back, we did this by knocking down an air crossing. Didn't know what we were doing but knew if we did that, there would be a balancing effect but at Rawdon this is where it was really developed. We had to do something or we would have never worked the main coal seam, because of the old men's workings above us.

Q. Did you pump the hardstem into the gob itself as well?

A. Yes, from time to time. And all the stoppings we injected. It was easy then to put stoppings on as well. All we did was to build a breeze block wall and just run the hardstem in with water, in fact just throw the bags loose and just put water on them. And they were good stoppings too.

Q. You were talking about the problems of development.

A. This was the real problem at Rawdon and John Northard, when I was sent there, said, "That's your problem, I haven't solved it yet. The problem is still there and has to be solved." I held a meeting of all the staff at the mine after I had been there about 3 months and I said the biggest crime that any management at a mine can commit is to run themselves short of face room, short of coal when it's there to be got. And I said we're going to change our priorities here, over a period of time, on the mining of this mine. The first 3 jobs that are going to be manned up in this mine are development, salvage and installation. In that order. And the first question I got was, "Gaffer, why in that order?" And I said you've got to develop first of all, and you've got to get all the machinery on after you develop so you've got to salvage, and then when you salvage you've got to install. And the fourth priority is the manning up of the production faces. They all threw their hands up in the air.

Q. Let's take those in turn. All the faces were advancing faces, is that right?

A. No, some were retreat because of the spon-com.

Q. O.K., going back then, when did retreat faces first start to appear in the British coal fields? I always remember advancing faces. I remember all the talk about retreat faces but I never saw one.

A. We were all advancing until I went to Rawdon and we had all these fires, which made the accent on development even more critical. We lost no end of faces by advancing in the Main Coal, in the old men's Main Coal on the second lift.

Q. Because of the spon-com.

A. That's right and we had to do something different. And they always said the roads won't stand on retreating. So I said well, we're going to try, we're going to have a go because to me the roadways must stand because there's no pressure there. It's already gone from above you. They have already had it - so the roads will stand. And that happened and I started retreat mining at Rawdon colliery. I didn't really want to do it because it was more development again. And with the faces only lasting 6 months you had to be one step in front. This is why I had to bring up these priorities. It took about 12 months to get it all turned around. Meanwhile I had to drop the output. And again I was sent for but I said, "Well this is it, what is the alternative?" Fortunately I got Sam McKee behind me and he backed me. I'll give him that one.

Q. What was the method of development? What was the method of roadway drivage.

A. We had just brought in the first - and this helped - Dosco header and we'd also got 2 Joy continuous miners as well.

Q. Imported from America?

A. Yes. And because it was a destressed zone in effect, we could work them. So I had 2 JCM's and a Dosco roadheader. With the roadheader, we had to take some stone with the seam.

Q. This was a relatively thick seam? And you still had to take some additional roof out?

A. Not in the Main Coal. I had sufficient there. We had to take roof stone in the thinner seams. By that time as well we'd got new roadway supports, the Holly Bank arches.

Q. These were sliding arches?

A. No, these were the arches which met the profile of the JCM - not a semicircular arch - they were a hinged arch with a bore in the top and 2 legs on, articulated. They just came at the right time for us too. We could cut our roadways 7 feet high, taking out some floor and keeping under the old men's workings in the main coal.

Q. Did you ever experiment with roof bolts?

A. I did once at Nailstone and I had the whole roadway collapse in the Yard Seam. Again, it's because the seams had been worked above and below. Nothing to anchor to.

Q. So then the predominant method of roadway support was steel arches?

A. Yes, in the roadways it was steel arches, in the main roadways it was - and where we took out strata above the seam we made them semicircular, that was the roadways - but where we drove in-seam and JCM's, we used the Holly Bank arch which was good for the cutting profile, a very good thing. And it was so easy to take one leg out as well when you brought the face machine across the roadway. You just unhinged it. It was like a hinged bar in effect. I expect you've seen photographs of it in the Mining Engineer from time to time. In fact, it was developed at Rawdon, a chap called Ralph Knight from Hollybank Engineering and I developed it with JCM's. So for 12 months, with permission, we dropped the output at Rawdon and got all the Main Coal faces onto retreat. Once we got our development far enough forward, we could then alter our mine production from time to time. Also, I cottoned on to the effect of summer prices. We stocked coal in the summer and couldn't sell it. That was the time to drop the output and bash on with development like mad.

Q. The prices were lower in the summer?

A. Lower in the summer. After I got the mine right and got it on to retreat mining and full face mechanisation and skip winding, they made me general manager at Rawdon and that was in 1968. They made me general manager. We had the highest output in the Area, and the highest productivity. For the record, in 1965 I was elected a "Fellow of the Institution of Mining Engineers", an honour which I treasure.

Q. Turning to your second category. Development was first, salvage was second with short life fast moving faces. This meant that you were continuously having to move face equipment from an old face to a new face. And that, I remember, was subject to many inquiries about the most efficient way of doing this, a lot of operational research programs were produced, and so on. Looking back on that now, what was the sequence of operations? You've got one face which was finished here, you've got another one across there that you've got to move on to. What was the sequence of operations that you developed?

A. Well, we always had to have one face in hand. And it was a very critical path. You had to watch it, like a jig saw. You always had to have one face in hand in each seam and dovetail them in. In other words, virtually as one face started, you'd got your face supports almost ready, in effect, for when the next face was developed. And that was developed and run in before the face finished, so you'd only about 5 months, not 6 months. It was a very critical path on that as you can well understand. There is one other point as well which was quite obvious. It's a brave man that does it but it's the wisest thing to do. You do not run your face to the bitter end when you get into rough conditions before you salvage it. You're far better stopping short of where you know there's going to be trouble and salvage it in the most perfect conditions that you can get. We lost coal but we gained in the end because we had an easier salvage. And also with the faces going with lives of only about 6 months and some less than that, there wasn't much overhaul to be done from face to face. We never did a face to face transfer. We always had another set of supports ready. Again, this is the critical path I was speaking about.

Q. So you took all the equipment from one face that was finishing and put it into stock and another set would go onto the new face.

A. Stored underground. We used to bring a set of supports out to the surface when we'd done 3 faces for a complete overhaul.

Q. What was the order of moving equipment off the face? Presumably you took the shearer off first? Or whatever it was, the power loader?

A. We took the power loader off first. Then we took off the armoured face conveyor. We installed an endless rope haulage on the face line. And took the chocks off.

Q. By putting on what, temporary timber supports?

A. That's right.

Q. When you were opening up a new face, before you took the power supports on, those were timber or steel temporary supports?

A. It was a face heading in effect. Dowty props. Dowty props and RSJ's.

15. CHANGE OF ROLE TO GENERAL MANAGER AT RAWDON, 1968

Q. O.K., that brings us up to 1968 when you changed your title from an agent manager to a general manager? What did that mean in practical terms to your duties and responsibilities?

A. I've got some minutes which I've kept of the first meetings I held with my staff when I became general manager. I decided that as this was going to be a general manager mine that I was going to run it in that way, as a general manager. And I think it will be interesting for you, I will find them, and let you have a look at some of the minutes from the meetings I held when I became the general manager and that will - rather than put this on tape you can have a look at that. I ran it then as a complete business in effect.

Q. Let's take this stage by stage. First of all, what was the hierarchy of management with the general manager at the top of the pyramid. Last time we talked about this it was colliery manager and maybe two or three undermanagers. How did that change?

A. This had to change because of the size of the enterprise. I had two deputy managers, one was the deputy manager of operations, who was my second in command, and I had a deputy manager of services, who was in charge of development, salvage and installation in effect although the ops manager had overall control. The deputy manager for services had his own men and officials and he had priority over certain things depending on the critical path that I was talking about. I had two undermanagers, one in each mine. The mine was split in two because of its size. And they reported to the deputy manager ops. There was a liaison between them and the deputy manager of services under statutory requirements. And then we had district overmen. There were six district overmen, 2 faces per district. Either five or six - five district overmen looking after two faces and all the ancillaries that went with them. We had a colliery overman in each mine. They were immediately under the undermanager. There was an undermanager, then a colliery overman, district overmen and then deputies for the faces.

Q. What was the distinction between these various management levels and the statutory responsibilities which I know at that time anyway were defined as the owner, the manager, and the undermanager - those three were named. Who were the other people who were statutorily responsible for all this hierarchy?

A. Well, under the Mines and Quarries Act, it was then and still is now, although they are in the process of changing it now, that there were only really 4 statutory jurisdictions under the Mines and Quarries Act. That was the colliery manager, who was statutorily responsible for the whole of the mine, there was the undermanager who was statutorily responsible for again the whole of the mine.

Q. The undermanager was responsible under the law only for the underground?

A. No, under the Act he was still responsible for the surface as well. Although it didn't happen, but he was. And then there was the overman who was classed under the Act as an official superior to a deputy but inferior to the undermanager, and then deputy. That was the statutory line. So the deputy managers who had to be appointed - and in order to give them statutory responsibility, they had to be appointed as undermanagers, although their designation was above that.

Q. But the named undermanagers were still responsible under the Act.

A. That's right. It was only because of the size of the enterprise that you had to have more staff. You had to have a different organisation at a very very large mine than at a small mine.

Q. O.K., so the general manager had the statutory responsibilities as defined for the colliery manager.

A. Exactly the same.

Q. When you became general manager, did this mean necessarily that you became more remote from the day to day operations that we talked about. The phasing of development, the salvage and so on?

A. Yes, I had a bit more staff and I believed in delegation. I always used to check up obviously. I still went down the mine, but I was able then to give a lot more thought and a lot more time to other things such as the business side of the enterprise which, when I was first a colliery manager, I never even thought about. All I thought about was getting coal out of the mine.

Q. The business side being what? Define it for me.

A. The quality of the fuel that was going out? The coal quality. Costing, the cost of materials. Capital investment and the return on capital.

Q. None of these things had been covered in your initial mining education up to the stage of getting your first class ticket anyway, so how were you able to acquire the knowledge to be able to handle these non-production oriented activities?

A. Well, the Board then had set up a staff college at Chalfont St. Giles. And I was sent, just as I was finishing at Nailstone, I was sent on a 10 week course to the staff College and it was a full time course with syndicates and corporate planning, finance, problem solving, etc., etc., all gone into in fine detail. The course then started to make me think about other things, forward planning and costing, capital investment. It was just another phase of management. In fact before then we never thought about it. We got a little cost sheet once a month from Area, you know, your timber cost was so much a ton and this sort of thing. It was meaningless, really. Wages costs was one but you knew what you were paying your men, you knew yourself what was happening. You used to have sheets come from Area giving your wages cost each month and what your profit was, but the important thing then, because the country was short of coal, it was coal virtually at any price, and it didn't really matter, but things were changing and I could see them changing, and that's why with getting more staff I was able then to sit down and think more about these things.

Q. So you were enlarging from what one may refer to as a simple mining engineer into a mining engineer/business manager.

Q. Maybe we could take up the story from 1968 when your title changed to general manager at Rawdon. Previous to that you had been agent manager.

A. I think I spoke earlier about more involvement in the business side of management and how the organisation at the mine under a general manager changed. I had a deputy manager of operations appointed to me and he took over what I would term the routine duty, the day-to-day operation of the mine from a production point of view. It gave me much more time to think about the business side of running a large mine. And that, I think, was very successful because up till then a colliery manager's function was simply to plan to get coal out of the ground and the accent was always on output and productivity. A manager up to then never looked into the business side, or thought about costs in the deeper sense, capital expenditure, return on capital, so the accent at a large mine was starting to change. I think it proved to be successful because Rawdon then went on from strength to strength. I was able to sit down and think about new techniques, to look around the country, to see what was happening elsewhere, and to be involved with engineering firms to see what they were doing, to be involved in research and development as well, and to have time to think and look at a whole range of new techniques that were coming on the market.

Q. How did the Coal Board prepare you for this significant change in role?

A. We had a staff college at Chalfont. Remember I said I had spent some 10 weeks down there when I was at Nailstone. There were further advanced courses run at Chalfont St. Giles. We brought in what was termed "management by objectives" which was another new term.

A new thinking. It was introduced in order to prepare the newer breed of manager to think about other things - other than the routine day-to-day running of the mine. So it was a much broader management role than was usual at much smaller mines. We were sent on various training courses to our staff college, we met a lot of people from different walks of life, not just in coal mining but in other spheres as well, outside industries, we had quite a lot of people there. We learned from each other, just by talking and exchanging views, but the Board also imported other specialists into their organisation in new management techniques. I mentioned management by objectives and other things that were really changing the whole aspect of management, and as I said, from day-to-day management of a mine, managers at the larger mines were now being trained to look at management in a much broader aspect than what went on before.

Q. You mentioned research and development a while ago. What was changing here? We talked earlier about the development of new machines with the Meco Moore, the trepanner and the shearer, then the coming of the armoured face conveyors and self advancing supports. That was all an evolutionary process. What was this new form of research and development that you mention now?

A. It was looking to see where we could improve on the existing machinery that we had already. We felt that what we had now with the armoured face conveyor, with the self advancing supports, with the shearers, we felt that we'd got the basic machinery that was able to give us the output that was required. What we were after then was to make it more reliable and to make it better, but as basic machinery, we felt that we'd got it right. So our research and development was going into other things using the same machinery that we had. For example, we were always getting a lot of trouble with haulage on the shearers, we started then to develop the chainless haulage systems on shearers. In point of fact, I first mentioned this to a chap called Gerry Pentith who was then our area mechanization engineer. Instead of having a chain or a rope on the face we ought to be looking at something that could be fitted onto the conveyor on which the machine could haul itself along. I was thinking about the sort of rack and pinion arrangement that I once saw on a railway going up Snowdown mountain in Wales. I mentioned this to Gerry Pentith and he then left the Board and set up his own firm called Pitcraft, which developed the first rackatrack. He says to this day that I was the one who gave him the first idea of it. That was one aspect of it. Other firms took it over as well and there was quite a variation on chainless haulage. That was a massive step forward. It certainly cut down our stoppages on the coal face. And of course increased the running time on the machinery. That's what it was all about, increased machine utilization. Other aspects involved monitoring. Monitoring the face delays and, in fact, monitoring in its broadest aspect. We got down to doing all sorts of things then. We started to monitor the health of the machine, and instead of waiting for it to break down, we took it out of service before that happened. All these advances were coming to the fore. Further developments carried on, monitoring other things. For example, deployment of the man power. Previously, all the men were deployed in the pit bottom. We were now getting to the point that all the men were deployed from the surface. And every man was monitored as soon as he walked into the pithead baths. Management knew he had arrived, they knew what occupation he was, and he was deployed there and then so that when he got into the pit bottom he was already deployed. So we could deploy much faster. This again led to more efficiency because we did not have to wait until the people arrived at the shaft bottom before we knew they were there. So all these aspects of monitoring were starting to come to the fore. And, again, they added to efficiency.

Q. What role did the Bretby Research and Development Station play in all of this and how did they relate to the mines?

A. They only came to the mine for two reasons. First of all, if you wanted help, you asked to be advised on certain things. They were an aid to management. That was one aspect of them. And the second aspect was that if they had developed a new technique or a new piece of machinery, they used to send their people there to monitor it, to watch it, to see what was happening. And to see whether there were any changes required. And that wasn't just on machinery, it was also on supports as well.

Q. Did they do their own .. what I'm really getting at is where did the ideas come from? Was it a combination?

A. It was a combination of colliery, areas, national, and Bretby. There was a liaison committee set up in each area which tied in with Bretby when new developments were taking place, any problems that we had got that they might help on, any ideas we had got as well, they took them away and they developed them. And so it was a two way thing. There was a liaison committee set up in the area, colliery management were involved in it, and it was an on-going arrangement.

Q. When did manriding start to appear in the pits?

A. Oh, it had been about a long time. I can remember when I was a boy with our father, the first manrider in Skellyton colliery. It was an old main and tail haulage system, two men just got into an empty tub and were transported. You had to get special permission from the inspector to do this, with certain safeguards. Oh yes, way back, I remember manriding as a boy and, of course, it developed from there. Basic manriding used to be that the men rode in the mine cars or the mine tubs which carried the mineral. Of course we developed from that and we had special manriding carriages that were shunted away when mineral was being transported. Once conveyors came in, belt conveyors, roadway conveyors, all the coal was then conveyed by conveyors to the pit bottom of the shaft or up a surface drift - all by conveyor straight into the washing plant, which was at Nailstone. And the same eventually happened at Rawdon because they drove a surface drift at Rawdon as well, just before I left Rawdon in 1970, into the upper seams. So manriding was part of the materials system which, initially, was just an ordinary track. But then we brought in manriding cars which were a fleet of carriages attached to an endless rope haulage. After the men had been ridden in, the manriding cars were shunted and then they went on to materials transport, using materials carriages. Belt manriding was developed too. We never were allowed to ride men on the same conveyors that we conveyed coal with. The inspectorate would never allow that. You had to have separate conveyors. These were mostly on inclines where, instead of putting a manriding car on the haulage, we developed man conveying, but of course we only rode up and walked down.

Q. Let's move forward then from your general managership at Rawdon. What happened next in your career progress?

16. AREA PRODUCTION MANAGER FOR THE LEICESTERSHIRE COALFIELD, 1970

A. Well, in 1970 I was appointed area production manager for the Leicestershire coal field. This was a fairly substantial job. And when you say area production manager, it's only a title. I was appointed under the Mines and Quarries Act as the owner of all the mines in Leicestershire which gave me statutary responsibility over all the mines and colliery managers. There were nine mines in Leicestershire.

Q. Can you name those mines?

A. Yes, Desford, Merry Lees, Bagworth, Nailstone, Ellistown, South Leicester, Whitwick, Snibston and New Lount, plus various outstations as well, pumping stations that were up and down the coal field. These had to be looked after as well.

Q. Of those mines, you had already been undermanager at Ellistown and manager at Desford, Merry Lees, Bagworth and Nailstone. So you had four more mines that you previously had nothing to do with.

A. That's correct.

Q. Outline your duties as area production manager there at that time.

A. As I said, it's a title, not a job description. I was accountable to the area director for the whole working, the whole operation of the coal field with the exception of marketing. That was the only aspect that I hadn't got any jurisdiction over except for coal quality. Everything else I had. I had to make certain that the mines were managed properly by the colliery managers, I set the objectives for each colliery manager in terms of output, productivity and profit. I was also responsible for making certain they had the necessary resources to carry out their objectives in respect of manpower, capital expenditure, materials, everything that appertains to the running of a mine. I had to make certain they had what they required in order to carry out their objectives. I had a team of specialists on my staff which I could then send to mines where there were any major problems. I used to send these specialists in to give assistance to colliery management. I had a coalfield mechanical and electrical engineer, a coalfield planner, a coalfield mechanization engineer, I had method study, mechanization, strata control, ventilation and safety. Now these were specialists under my control who went out to the various mines to help with problems and to assist colliery managers and their specialists at the mines with any problems that they had. In other words, instead of running a mine I was running a coalfield, a group of mines. I soon found out it was an entirely different technique to be used than managing a colliery because to manage managers, as people, is altogether different to managing workmen.

Q. Tell us something about that difference.

A. Well, the difference being of course that colliery managers have their own thoughts, their own ideas, and you had to make certain that these ideas were developed properly, you had to - it was a question of commanding respect, which is probably the wrong word to use, but sometimes you did command respect of workmen by virtue of your position as a colliery manager. I always tried to earn respect from people, managing by example, and certainly in managing an area, respect had to be earned.

You only earned that by the amount of help and guidance you could give to colliery managers, and that's how you got the best out of them. And that's how I motivated them, again, by earning their respect through my dealings with them. There were times, however, you had to put your foot down. It wasn't all easy sailing, but on the whole you got it by how you conducted yourself, how you helped them, how you used other people to help them, you got the best out of them that way.

I used to have a manager's meeting monthly. I set this up, and it was something that had never been done before, but I got them all together. It wasn't to lay my policy down, it was to get them all to talk. Talk about their problems at their own individual collieries and learn from each other. And that, I felt, was a great help, not only to them but also to me as well, Because while learning from each other, it really stopped me from going and picking somebody else's brains and then trying to get other managers to accept some ideas somebody else had developed. They used to ask each other questions. Sometimes they got quite rowdy. I didn't mind that. I never kept any minutes of the meetings either. It was just a sort of a talk-in between all the colliery managers and it was amazing, after a few meetings I could see a real benefit coming from it. It was absolutely amazing. Other meetings which I held - I used to hold a planning meeting at each of the collieries every 3 months. I brought in all my specialist planning people. Together we would examine all the mining plans and look at forward planning - where we were going. This is underground workings now. So that was another meeting and was held at each colliery. I chaired that meeting with all the area specialists and the colliery manager's team as well. Another meeting which I held at each mine every three months was a capital expenditure meeting to look at what had been spent, what had to be spent, any new schemes that were coming forward, to debate them and to reach an agreement and then, of course, I then had to get the money in order to carry this out. So those were the three basic meetings that I held - I held the managers' meeting monthly, which was a talk-in, in effect; a quarterly planning meeting; and a quarterly capital expenditure meeting. Those were the basic meetings I had. And then of course I visited each colliery regularly. I tried to do a minimum of two underground visits a week, sometimes it was more, sometimes it was less depending on other commitments at Area that I had - and also outside of the area. But I did try to do a minimum of two, and more if I could but it was, on the average, about two underground visits per week.

Q. I presume these underground visits were to places where particular problems that had been brought up.

A. That's right. It was nice to go down sometimes when there wasn't a problem. I used to enjoy to just go down and chat with the men. And chat with the officials underground. I enjoyed that. But I always took the colliery manager, the overman and the deputy of the district with me. Serious accidents - I had to investigate these personally with the colliery manager and his team. That was reportable accidents, fatalities and dangerous occurrences. It was in my portfolio that I had to do an investigation at colliery level following each of these accidents and to submit a report to the area director.

Q. What were the sort of problems that used to be brought up by the mine managers for your advice? Were they geological, spontaneous combustion?

A. Spontaneous combustion and geological problems were always ongoing. Industrial relations was always a big problem. I was actively involved with the area unions and such. The NUM, NACODS and BACM. This was area wise, not colliery wise. When the colliery manager had any dispute at his mine or if he couldn't settle it with his local representatives, they called in their area people and the colliery manager informed me. I then had to arrange an area meeting in order to resolve it. That was the next stage in what they called the conciliation machinery which was appertaining at the time. And then if I couldn't settle it, it had to go to arbitration. But I never, in all my time that I was production manager, I never had one go to arbitration. I could always settle it. Even if it was just with some form of compromise. Sometimes the manager was right, sometimes the men were right. I think that when you can look at it sometimes from the outside that the manager wasn't always right. He was sometimes wrong, and that could get a bit sticky at times but, again, it's a question of how you play these things. When that did happen I used to go to the manager and say: "Let's get this settled, if it goes anywhere else we're going to lose this case. You can either let me settle it but I would prefer you to get your men in, this is my advice to you, and settle it." I found that was a far better way than me making a decision for them. Rather shove it back to them and say: "Look, if you don't do it this way, all right, but it's going to go somewhere else and we're going to lose."

Q. Were these primarily wage problems, wage demands?

A. Wages mostly. Sometimes they concerned discipline, suspension and dismissal. Wages, allowances, change of shifts, the men doing something which they didn't ought to do underground, striking an official.

Q. Unsafe behaviour. I was going to ask what sort of behaviour would warrant dismissal?

A. Striking an official, putting in danger anyone else in the mine, chronic absenteeism.

Q. How much freedom did management, including yourself, have on wage negotiations? By this time were there not national scales for mining people in the various categories?

A. Yes, the basic rates for day wage workers were handled by national agreements. But we had an incentive scheme for the people who worked on productive work. And they had bonuses. Face workers and development workers. Method study was used to study jobs and performance.

Q. Did that give rise to some problems?

A. It did, and I sent the union people away on method study appreciation courses. This made them understand what it was all about, and when the study was taking place a union official was on the job with the method study people to observe. When the report on the study was published they had an opportunity to go through it with the method study people before it arrived on the colliery manager's desk. Sometimes they couldn't agree so I had to sort it out with the area union officials. The method study decided the wages, the amount of bonus that they earned at the end of the day. Method study set what was termed a "norm" and the rate then was set at 75% of the norm which meant that anything produced over 75% was bonus and, of course, they argued like mad to get the norm down as low as they could so that they could achieve more bonus and greater earnings. Negotiations were always required on this one but we always managed to sort it out. One or two disputes occurred, these things happen in any organisation, but on the whole I didn't have a lot of trouble. I believe it is a question of mutual trust and sometimes compromise.

Q. What was the hierarchy of the NUM within the Leicestershire coal field?

A. There was an area agent/secretary. This was a chap called Frank Smith when I first arrived. But he retired fairly quickly and a chap called Jack Jones took his place. So he was full time, employed by the union full time and he had a president.

Q. National president you're talking about?

A. An area president. And an executive committee which was comprised of delegates from individual collieries. One delegate per colliery. That formed the area executive committee.

Q. Did you, as a matter of routine, meet with these people on a regular basis?

A. Yes, I met Jack Jones on a regular basis. We were often on the telephone to each other but I met him as well on an informal basis unless there was a situation at the colliery where the management and the local NUM delegates could not agree. Then Jack Jones had to come in from the NUM side and I had to come in from the Board side and that then was termed an area meeting.

Q. Let's go into that a bit. Finish off the hierarchy at the NUM. We had the area agent/secretary Frank Smith, then Jack Jones who reported to and worked with an area president. Who was the area president at that time?

A. Martin Ryan.

Q. Did they have an election for a new president every year?

A. The president was elected every three years but the agent/secretary was full time - for life, or until the area executive sacked him. That never happened in my time, but I understand they had that power.

Q. And the executive committee was made up of delegates from each mine. Coming below that, presumably there was some kind of NUM hierarchy at each mine individually.

A. Yes, there were branch committees at each mine. Each mine had a branch committee. But the delegate was the one who was the link between the committee and the colliery manager. They had their own branch committee which they set up themselves. This was run by the men at the pit. And the same with the NACODS, the deputy and overman association.

Q. What about the consultative committees at mine level? Were the same people that were on the branch committees also on the consultative committees?

A. Yes, each mine had a consultative committee and a safety committee which met regularly. The consultative committee met fortnightly and the safety committee met monthly. We had an area consultative committee as well which involved the area unions. And they had a safety committee as well.

Q. O.K., we've been talking about industrial relations here. Going back through this period, and I'm thinking of the '70's now, those 10 years of area production manager, what do you recall about the 1974 strike when the country went on a 3-day week.

A. Just before we go on to that, shortly after I took over, New Lount colliery was coming to the end of its life and that closed down fairly quickly. We merged Merry Lees with Desford for the second time. Merry Lees ceased to mine coal. All the coal was conveyed from Merry Lees underground to the Desford shafts and then, in 1971, Nailstone merged with Bagworth. Nailstone ceased to mine coal. A plan to bring the output from Ellistown colliery, to convey it underground to Nailstone drifts and bring all the coal up Nailstone drift into a central washery had been mentioned earlier. I well remember Ralph Rawlinson, who was the deputy director of mining at the time, saying to me when I was appointed, "There's one thing that you must never do, Jim, you must never say to Mr. Sanders (who then was the area director) that you want to link Ellistown and Bagworth together or he'll have your guts for garters." I said, "Why is that?" And he said, "Well, Harold Taylor who was your predecessor, got moved because of this, because he made a right mess of it."

I well remember one day in 1972, I had a phone call from George Sanders, the area director, he was a bit of a fire brand - I don't want to be unkind to the man because he was very good to me - but anyhow, he was up and down like a yo-yo sometimes, and I had just appointed a new manager at Ellistown who used to be my deputy manager at Rawdon called Mick Skelding. I had a bit of a shift around of managers at this time. Reg Price at that time was manager at Desford and not getting very good results so I moved him to a specialist job at area, area development engineer, and he didn't speak to me for about 12 months. One day a knock came at my door and in walks Reg Price and he says, "Gaffer, I'm a silly bugger. Thank you for moving me, you were right. I'm in better health and I'm better now." "That's fine Reg." So I moved Reg from Desford, and I moved Lionel Lees from South Leicester to Desford, I moved Ken Bradford from Ellistown to Whitwick. I appointed a chap called Lawrence Collier at South Leicester, and I appointed Mick Skelding at Ellistown. That was it. I had a right shuffle round. So he had only been in post then at Ellistown about a fortnight when I had this phone call from George Sanders. "I want you to meet me at Ellistown now. I'm on my way. It doesn't matter what you're doing. I want to see you there now with the manager." My coalfield office was nearer to Ellistown than Coleorton Hall so I was there first and I said to Mick, "Just keep quiet, I don't know what's cracking off, I don't know what's happening, but it won't be your fault, just keep quiet. Unless he asks you a question, don't volunteer anything because I know what he's like and he's got something on his mind." So in about 10 minutes time the door flew open and in walked George Sanders, he always wore a trilby hat. He took his trilby hat off and threw it up on the hook, and he looked at me and he looked at Mick Skelding. He said to Mick, "You've only been here a fortnight young man." He replied, "Yes sir." He said, "Well, you don't know much about what I am going to say, so you had better keep quiet." Now, he said, "Jim, you've been here some time now, what the bloody hell are you going to do about this colliery surface?" Well, if you remember Malcolm, it was an absolute abortion, the old screens racing up and down and the dust flying about. I said, "Let's go outside Mr. Sanders." The office was in the top stairs, you remember? "That's a good idea." So I walked down the stairs and I walked across the road toward the canteen. He says, "Where are you going?" I answered, "I'm just going to show you something Mr. Sanders." And I turned around. Then you could see all the old screens and the rattle and the noise. And I said, "It's an abortion." He says, "I know it's an abortion, what are you going to do about it?" I said, "Knock it all down." And he said, "Knock it all down? Knock the whole lot down? And what are you going to do then?" I thought, here I go. I said, "Take all the coal from underground and take it up Nailstone drift and wash it in the central washery." He said, "You what?" I repeated, "That's what I would do." And he said, "How long would it take you?" I said, "12 months." "Get on with it." He jumped in his car and went off.

Q. What was his previous objection to doing that?

A. I don't know. I have no idea. I didn't get into the ins and outs of it. But obviously something happened between himself and Harold Taylor, my predecessor. Whether he was trying me out or whether he had sensed something had to be done I don't know. And by the time I got upstairs to the manager's office, he had already gone. I picked the phone up and rang Rawlinson and I said, "I've done it." And he said, "What have you done?" I said, "I've just told the Area director that we should knock all the Ellistown surface down and take the coal up Nailstone." He says, "What did he say? Has he sacked you?" I said, "No. He told me to get on with it and I've got 12 months." And Rawlinson says, "Well you better get on with it then." And he never interfered one iota. I then called a meeting of Mick Skelding and his brother, they didn't talk to each other. Mick was manager of Ellistown, Stewart was manager at Bagworth. Two brothers and still don't speak to this day. Something happened that I don't know about, whether it was family trouble. Anyway, I got them together and I said: "I am going to send in my specialists, we're going to bring both outputs up the Nailstone drift. A set of conveyors have already been earmarked for it. They are in mothballs. And the drivages are virtually complete. We have 12 months, let's get a progress chart out and get your heads together. I'll give you three days both of you together. Get both your staff together and I'll call a meeting in three days time. I want to see what you've got down on paper." So they had to get together. And in three days time, bless them, they had a timing and progress chart, and in 10 months the coal was coming up the Nailstone drift.

Q. How much underground drivage was necessary?

A. There wasn't a lot. There was only a small link road to drive - about 100 yards, and excavation and installation of a surge bunker, that was all.

Q. So then all three mines were connected? Ellistown, Bagworth and Nailstone, and Nailstone was just a means of transportation?

A. Transportation of coal and washing it.

Q. But no mining.

A. Coal preparation, that's all.

Q. So that was 1972?

A. That's right. And by 1973 all the output was being surfaced at Nailstone with a great saving in man power and productivity.

Q. So you were then able to clean up the whole of the surface at Ellistown. Presumably Bagworth as well - the old coal washing plant at Bagworth?

A. That disappeared when they brought all the Bagworth coal up the Nailstone drift in 1971.

Q. So the shafts at Ellistown and Bagworth were just service shafts, ventilation, man riding and supplies?

A. That's right.

Q. You talked about moving managers around, appointing them. Was that within your agreement, to be able to put the managers where you wished and to make the appointments that you wanted?

A. Well, I consulted my superiors obviously. But I had to make a good case as to what I wanted to do, not only for managers but deputy managers, undermanagers and engineers. I always had to take account of the financial people at area. Your brother, Malcolm, was a bit of a law unto himself. I didn't suffer fools gladly. I did not get much interference from the hierarchy, I think due mainly to the fact that Leicestershire had the highest productivity of any coalfield in the country. We had good management at all levels, a first class work force, coupled with good industrial relations.

Q. O.K., move on from there where, in 1972 you had this big change in the Ellistown, Bagworth, Nailstone complex. You had to close, or at least combine Bagworth and Desford by this time. What was happening during this period at the other mines?

A. They were still as they were. South Leicester, Snibston and Whitwick all under separate management. Ellistown and Bagworth were also under separate management. From Bagworth, the coal all went to one coal prep plant. There was a cost put on Ellistown, for coal washing - so much per ton.

Q. Were all of these mines now fully mechanized?

A. Yes, absolutely, no hand filling at all. All with powered supports. And just before the '74 strike, the Leicestershire coal field became the first coal field in the country to exceed an output per manshift of over 4 tons a man. That was in 1973.

17. THE 1974 STRIKE

Q. O.K. do you want to tell us your recollections now of the lead up to that big strike. That was a historical strike inasmuch as it brought a government down and put the whole country onto a go-slow.

A. The Leicestershire miners are not strike minded at all. It was a national ballot and the majority were in favour. It was over wages. Joe Gormley was the national president and they did it properly, they had a national ballot. In my view the National Coal Board got it all wrong. I think the Prime Minister, Edward Heath, was very badly advised. The miners were underpaid, there's no doubt about that at all in my view. Certainly I speak for the Leicestershire coal field, we were producing well, and my sympathies - although I was a high official of the National Coal Board - lay with the NUM. And I openly said so. The National Board said they'd negotiated as far as they were going to go. It was a national agreement, it was the day wage workers' basic rates that they were in dispute about.

Q. Who was chairman of the board at that time? Was it still Alfred Robens?

A. No, it wasn't Robens, it was Sir Derek Ezra. He was a marketeer. He came from marketing. I was very disillusioned. In my view they could have settled that strike very easily. Joe Gormley, whom I knew very well, was a moderate, he didn't want a lot more. There was no question then of any closures taking place, it was purely on wages. He went for a national ballot, and he got it. In the end Heath went to the country. They were still on strike when Heath went to the country.

Q. Yes, but wasn't a lot of political pressure brought on the Coal Board because, as I recall it, it was a time when the government were trying hard to get inflation under control. They were trying to hold back wages on all fronts. Isn't that right?

A. Yes, that's so but they were holding back the wrong people. The miners, in relation to other industrial workers in the country, were very very poorly paid. They aren't now but they certainly were then. In relation to a car worker, for example, working in Coventry not very far from here, they were way way below their earnings, and they were working in an environment far different from anyone else. And they weren't getting, in my view, fair recompense for the work they were doing. I think the National Board were advised that it was political. It was not. You're probably right, Malcolm. It was probably because the government were going to hold down wages at any cost because of the economic situation that the country was in. It probably was that, but in my view they took on the wrong lot and they certainly took on a chap who was not a left winger. He was a very, very moderate man - Joe Gormley, now Lord Gormley. I had long chats with Jack Jones over it and even Leicestershire miners went on strike because they went along with the national ballot. And to me it was tragic. Men talked to me who didn't want to go on strike, but it was a national thing, and Jack Jones certainly didn't want to bring them out on strike. It could have been political, as you said. I think there was something more which I didn't know about and has not yet been revealed because it's still in the archives. It will come out eventually. But it was the wrong time for the government to dig their heels in, it was the wrong time for them to take on the miners. It was the right time for the miners because the country wanted coal. We hadn't got a lot of stocks. The stocks were getting down, and in the end Heath went to the country. He called an election. They lost the election and the first thing that the new Prime Minister, Wilson, did when he got into power was to give the miners the money they wanted.

Q. The country went on the famous three day week when factories were closed for 2 days a week?

A. Yes, they hadn't got the stocks, they hadn't got the coal stocks, plus the fact as well they didn't have the link across the channel for electricity like they had during the second strike and which, by the way, Scargill didn't know anything about. I'll tell you about that later on. I remember going past Drakelow and that big power station, the one out where you were Malcolm, Ratcliffe, you could see the coal stocks getting lower and lower each time you went past. All industry was closing, the lights were dimmed and there were power cuts. They virtually brought the country to its knees because the National Board and the government also had not prepared for a strike. They didn't think that the miners would strike. And they hadn't got the necessary stocks, they hadn't got any imports coming in either, any imported coal coming into the country. And they certainly hadn't got any other resources. That was it, and that's why Heath went to the country.

Q. How long did the strike last?

A. Not long, about 6 months plus. The miners had got a lot of public sympathy, as well, on their side. Joe Gormley came on television, he wasn't a left wing like Scargill, he was a moderate. And he explained the situation to the general public. Most of the press were on the miners' side too.

Q. I remember Gormley came across as a very patient man.

A. Yes, he was, that's right. He didn't shout and bawl like Arthur Scargill does, and he had the media on his side and he had the general public on his side too. There were no pickets outside. It didn't require any pickets because they were all on strike. Virtually the whole country was all out on strike by working a 3 day week only. It brought down the Heath government. He went to the country over it and was defeated. As I've said, Harold Wilson got in and the first thing he did was to settle the miners' strike. They all went back to work within a few days of the election.

Q. Tell us about the aftermath. After the strike it must have taken some while to get the mines back into full production.

A. Yes, we had a lot of problems in Leicestershire because we have soft floors as you know and a bit of water and spontaneous combustion. We had a lot of trouble but, having said that, I did on occasions get Jack Jones to agree to have some men come into the mine when we had certain problems, such as spontaneous combustion and breakdown of pumping machinery.

Q. During the strike?

A. During the strike. I had cooperation from Jack and his executive. We worked during the strike as an organisation in Leicestershire. I can only speak for Leicestershire because in other parts of the country they used to have mines go on fire and also be flooded, and we lost some of those mines. But in Leicestershire I managed to get men working to safeguard the mine, faces and machinery when it was necessary. I got Jack Jones and his executive to agree to let men go in and help out. So, having said that, although it did take us a little while, it certainly didn't take us as long as some other areas. Inside a fortnight we were coming back up again in production. And it was only because of the cooperation and the goodwill that I and my managers had with the union in Leicestershire that we managed to do that.

18. WORKINGS UP TO THE RED MEASURES

Q. O.K., so we're now into the mid-70's. Take it from there on. Were there any other significant developments in mechanization, methods of working?

A. No, it was still as now, still longwall. We went to more retreating than we were. We went to more retreat mining rather than advancing.

Q. That was fairly unusual for the U.K. wasn't it? Retreat mining?

A. Well, I don't know, we started away back 30 years ago and did retreat mining then. But only in very special circumstances because it was the down time. We didn't have time to head out the roadways.

Q. The development time was the problem?

A. Yes, but better and more reliable development machines were coming on the market, which enabled us to develop faster.

Q. Tell me something about that second half of the '70's.

A. Not a lot to tell really, Malcolm, up till about 12 months before the next strike, the strike in '84. We had the usual mining problems, spon. comb., breakdowns, we started to develop MINOS at the pits. You know, monitoring everything, the health of machines, underground gases, all that sort of thing. That was coming along, again through Bretby. You know all about that don't you? The comprehensive monitoring system for machinery and the environment underground?

Q. A lot of that was developed and tested at Bagworth wasn't it?

A. Yes, that's right. Bagworth was the guinea pig for the country. We had computers and printouts of everything. And, of course, that is universal now in the mines. We developed that in Leicestershire and, again, very successfully. People from all over the world came and looked at it, but apart from that all we did through that period was to make our machinery more reliable by better engineering. That's all, it was still the basic longwall system, improving our techniques where necessary. But not a lot of change at all, very little. We'd got chainless haulage in, we'd got mechanization in development, we'd got mechanization in materials, we'd got everything going then. We just got the coal out of the ground with the usual mining problems from time to time. Strata control and the usual things that occur in mining - spontaneous combustion, water.

Oh, there's something else that I must mention during my period as the Leicestershire production manager. You can recall me telling you how I was nearly sacked as the manager at Bagworth way way back for making an inset in the shaft at the upper seams when the old management had always said, "Don't touch that." After the Knockshinnock disaster in Scotland, we were prohibited from working within 150 feet of the base of any strata which likely contained anything that would flow - mud or water. The elderly mining engineers and geologists were always nervous of the new red sandstone that they called the red measures in Leicestershire. Leicestershire in this area is a concealed coal field. The seams do not outcrop. They all incrop into the reds. It was always said that the reds contained a lot of water so that the upper seams could not be worked. Anyhow, that inset which I nearly got sacked for was a God-send when we started to develop the upper seams. We started to work the Minge seam which was the lower one of the upper measures and we put the existing inset to very good use. It saved a lot of time and money because we already had this inset into the shaft. The coal seams were the Minge, the Five Feet and Splint. The Five Feet and Splint sometimes came together and made all one seam about 11 or 12 feet thick and sometimes it split. Anyhow, we were only allowed to work to 150 feet of the reds.

Q. Were these seams worked from the bottom up?

A. Yes, we started at the Minge which was the lower one. That was the best seam from a quality point of view. That was about 5 feet thick.

Q. Was that because of the fear of the water above?

A. Yes, that's right, we had to put bore holes up every so often into the reds to test for water.

Q. Did you have any major problems with water coming down?

A. When we started to put boreholes in at Bagworth, we got some water and we controlled it with standpipes and a valve. But gradually after a day or two it went dry. We had special regulations through the local inspector and I negotiated these with him, that we would go to 90 feet, with extra boreholes up. One every day in each roadway. And the same thing happened, not much water and no pressure, from the reds. We then we got down to 60 feet. It was quite obvious that if we could only work to 90 feet or 60 feet, we were going to exclude a tremendous amount of reserves. The Leicestershire coal field would have been finished 15 years ago if we had not have been able to work the upper seams. I then got permission from the mine inspectorate to drive a small inclined heading into the reds with safety bore holes in front all the time and monitored by the inspectorate into the reds. This we did and we exposed the reds at Bagworth. The heading was dry and the reds were just moist. We then had permission to take the lot out and that's what kept the Leicestershire coal field going. But having said that, there were various places in the coal field where we got a lot of water. Desford was in a basin. We put a bore hole up there from a heading we were taking to the reds, there was so much pressure it was unbelievable. So we came out and sealed it off. If we had continued, it would have jeopardized Ellistown and Bagworth reserves of coal. So although we worked to the reds we still had safeguards for everyone's sake. We then got legislation for the rest of Leicestershire to go to the reds, and that's what kept the Leicestershire coal field going, and that's why we entered these big thick seams, lovely seams and away we went. That was the major development, being able to work all the coal up to the reds.

Q. And that was all the coal, there was nothing above that?

A. No, because it incropped into the reds. It's a concealed coal field in effect. It's only when you get towards Sinope - out towards Heather and Ravenstone - that the thickness of the reds lessen, but around Bagworth, Ellistown and Desford, the reds skirt round. The Leicestershire coal field is bounded on the western side by the new red sandstones and on the eastern side the Thringstone Fault which takes all the carboniferous system out altogether and brings in Cambrian and pre-Cambrian rocks.

19. THE 1984 STRIKE

Q. So this is coming up to the major strike. Tell us about the lead up to that - what caused it and how it developed?

A. Well, basically, Arthur Scargill, the National President of the NUM, in my view, was trying to bring down Maggie Thatcher. Gormley had brought down Heath and he was going to bring down Maggie Thatcher. The miners then were very well paid, they were on bonuses, they were making good money, but there was a threat of closures taking place. I think before that I must mention something else which is important. I could see that the Leicestershire coal field was in a rundown situation. Some mines were going to have to close. Not because they were unprofitable but because the coal was running out. The Leicestershire area of mine workers held an annual conference every year. And 12 months before the strike, I was invited by Jack Jones to give a talk at their annual conference. They had the conference in Scarborough. I had to have permission from the area director on the subjects I was going to speak about. I was going to talk on further mechanization, further aspects as I saw it, techniques, what I had heard from Bretby, what was coming in, anything new. But when I got there the night before, the delegates from some of the pits knew that they were running out of coal. It could be that nothing would be left in 12 months time. The managers had told them at their consultative committees and I had intimated at the area committees as well.

When I got up to Scarborough and had dinner the night before, with Jack Jones and his executive committee in the Scarborough Hotel, he said, "Well, what are you going to talk to us about?" And I said, "I'm going to talk about mechanization. I've got some slides." And he said, "No, we've had a meeting and we're a bit bothered, all the delegates are seeing that the reserves are not there in some of the mines and we want to know what's going to happen. We want to know what the life of the mines is, how much coal we've got left, what we can look forward to?" So I got on the phone to the area planning engineer, I already knew what years of life were left and, in fact, the first mine to close was Snibston. I knew that it had only about 12 months to run and then we were in trouble. No one had ever broached the subject before and there were rumours floating about closures taking place even then. I thought, "You sit still, Jimmy. Don't fan the flames." So I sat down and talked on the phone to my planning engineer and verified all the dates, and I rewrote the whole thing that night in my bedroom in the Scarborough Hotel. I told them exactly what the reserves of the mines were, how much coal we'd got and if it was possible to get it?

Q. Did you have to get clearance?

A. It was too late. I didn't get clearance. And I said, "What we really ought to do is for us to set up a liaison committee between ourselves on the Board side and the NUM in Leicestershire and plan together a gradual rundown of the Leicestershire coal field with a safeguard for all those men who work there either to transfer to other collieries when the coal runs out or, if they want, if they are old enough, if they want redundancy, we can look at that as well, but we ought to sit down together and plan the rundown of the Leicestershire coal field." "Oh, great, Gaffer. We know what's happening. That's fine. That's what we must do," This is how the Leicestershire miners were, and Jack Jones went along with me. So a couple of days after I got back home, Ralph Rawlinson, who was area director then, got on the phone and said, "What have you been shouting your mouth off at Scarborough about, this rundown of the Leicestershire coal field? You didn't have my permission. It's in the local press in Scargill country. I've had a phone call from the chairman, Norman Siddall. I didn't give you permission to say that. You were going to talk about mechanization." I said, "Well, when I got there Mr. Rawlinson, it was late at night and they wanted to know about the pits and you know as well as I do that the coal reserves are running out. They want to know what we're going to do about it, what's going to happen to their jobs. What are we going to do? Should I have said nothing? I believe they're entitled to know." He said, "Well you'd better get on with it now you have started it."

I rang up Len Harris who was then the deputy director of mining - super bloke. We really worked together and set up a liaison committee of all the mining unions, not just NUM but BACM as well, NACODS, Power Group, COSA, everyone. We set up a liaison committee to look at each mine individually and work out a plan for a rundown. We gave them a guarantee that as the mines closed, and we were planning when they were going to close, what dates we had in mind. Men could take redundancy on good terms because by that time we'd got clearance from national level and they were good terms. Or, anyone who wanted to stay in the industry would be found jobs within the area. The area meant Warwickshire, South Derbyshire or other mines in Leicestershire. So Snibston was the first one and we transferred men to Bagworth, we also had to transfer men into Whitwick, knowing that one was going in a couple years time.

So during the build-up to the strike we were already, in Leicestershire, the only coal field in the country that was closing mines, but we were closing them with negotiations, taking the unions with us. The plan that Len Harris and I set up was taken after the strike as a model for the rest of the country. And you know, Rawlinson never attended one meeting, because once we started to say that a mine was going to close inside about 3 or 4 months, Len Harris and I went out to that mine and met all the mining unions and agreed the closure. My industrial relations officer then interviewed all the men in that mine. All who wanted jobs were told where they were going to go. And those who wanted to be made redundant were told what conditions there were, and except for a few blips it went off smoothly. The Leicestershire Plan as it was so called was used as a model for the rest of the country after the strike.

I have to insert this as it occurred before the strike. About six months before the strike, Normal Siddall retired as national chairman. Ian McGregor was appointed by Maggie Thatcher and as Scargill said, "He was appointed as the Hatchet Man." That's what Scargill called him, "The Hatchet Man". He had just completed the rundown of British Steel, closing two-thirds of its capacity. This had also caused a strike in the steel industry, but it did not last very long. Scargill said he had been brought in to do the same to British Coal. He further stated that although wages were important, he was more concerned that McGregor was going to butcher the industry and he wasn't having any of it. Well, that may be so, but I'm absolutely certain in my mind that if there hadn't been a strike, we wouldn't have butchered the industry as much as it has been butchered now.

That's my view. I met Scargill before the strike, I was co-opted on to a national committee, I met him once or twice and I will always remember one meeting, it was chaired by Jimmy Cowan who was the deputy chairman, a Scotsman. He was ex-director of Scotland and became deputy chairman to McGregor. I can remember vividly one meeting with Scargill. He was asking some questions about the rundown, or pit closures as he called them. I'd been brought in to give an insight into what was happening in Leicestershire. It didn't last very long because everyone was in the strike situation. But I can always remember Scargill at this meeting, and he said, "This is no good, we don't want these plans." And I asked him a question. I said, "Why is it no good Mr. Scargill, when the miners in Leicestershire, knowing that the reserves are running out, knowing they can't get any more coal than there is to be got, is unsafe to get, is not workable, why are they accepting it?" And he wouldn't answer my question, he went off at a tangent. So I waited and I said to Jimmy Cowan, "Mr. Cowan, Mr. Scargill is not answering my question, I would like an answer." And he went off at a tangent again and wouldn't answer. I came back a third time. I said, "Mr. Chairman, I would like an answer from Mr. Scargill." And Jimmy Cowan said, "Mr. Scargill, I'm afraid that Mr. McPherson is being very insistent. You'll have to give him an answer." And Scargill looked at me with his eyes blazing and said, "I don't answer loaded questions." And that was the sort of person he was. When he didn't want to answer, when things were not going the way that he wanted them to go, he would refuse to answer. That's how I found him anyway. That was my little bit of knowledge of Scargill.

Anyhow, to come back to the strike, Scargill had made up his mind. He was right in one way that there were going to be closures and he was not going to accept any closures in the mining industry. Not even if it was planned like Leicestershire - no way. He was going to have mines remain open for his membership whether they were losing money, whether they were losing millions of pounds, and some were, what I would term holes in the ground and there were a lot of holes in the ground, Malcolm, they would never make money. They should have been shut years and years ago but nobody would take the decision, like we did in Leicestershire. Anyhow, he had made his mind up, no closures at any price. McGregor knew this and I believe accelerated the strike because the first pit to be closed before they went on strike was one right in the heart of Scargill country. It was Cortonwood Colliery in Yorkshire. It had lost, that year, millions of pounds. But obviously they were going for a fight. Now where the whole thing went wrong was lack of sound leadership - for instance, if Joe Gormley had still been in post he would have handled the situation quite differently. He would have negotiated. Knowing Joe, I believe it would have gone somehow like this. He would have said, "Mr. McGregor, what do you want tae dae?" in his Lancashire accent. "How many pits do you want to close, now come on, you tell me and where are they, how many do you want to close?" And he would have to have that answer. And what he would say then was, "Well, so long as it's done properly and also I want to know before I agree to it, what's in it for the lads?" And that's what Joe Gormley would have said. He would have sat down and he would have negotiated it. He would have put his mining experts into the mines to look at them as well, and they would have sat down with the Board's mining engineers and planned it properly, but with safeguards for his membership.

Now in my view, Scargill didn't care much about his membership. He was out for Maggie Thatcher, as I've said. He called a strike without having a national ballot. There was no national ballot. There were area ballots and Leicestershire voted not to strike. South Derbyshire voted not to strike. Notts voted not to strike. But gradually, with outside pickets and violence, he closed everywhere except Leicestershire and Notts. He got the lot out by his pickets and by pressure from other left wingers. It was only Notts and Leicestershire who remained at work with the odd mine in Warwickshire, but then they were in and out like yo-yos anyhow. They were in one day, out the next day and when the pickets got there they wouldn't cross the picket line so they all went home. But Leicestershire mines, with about 2 or 3 exceptions for the odd day, all went to work. We had pickets here from Kent and Yorkshire, violent pickets at times. In fact, one night I was called out by the managers and I couldn't get to Ellistown or Bagworth. The roads were closed. The police couldn't handle them. I couldn't get into the pit yard. I got in at Whitwick eventually and then finally I got in Ellistown and the police inspector said, "Look, if your men go across these lines there's going to be bloodshed." And I said, "Well, I think we'd just better rest quietly then for tonight." And the next day they went back in again. So we had a situation like that. Leicestershire miners worked throughout the strike under a lot of pressure because they didn't agree with Scargill or his methods. It was a very very trying time, Malcolm. I had numerous phone calls, threatening me. It wasn't a nice time and I was pleased when it was all over.

I retired after the strike because I'd had enough. It wasn't nice. It wasn't nice at all. But having said all that, it need not have happened. If we hadn't had Scargill and Heathfield and Richardson and Mick McGahey and the communists - if we had had the Joe Gormleys and the Frank Smiths and people on the national executive to sit down and negotiate the whole thing, it would not have happened. There had to be colliery closures, but as I've said before, in my view, they would not have been as severe as they have been. Since the strike they really have decimated the industry. There are some mines which struggle at times, you can always carry one or two lame ducks if you can see in the future that they're going to get better. But they really have axed them since then - really have carved them up. One can say the industry now is all right. It may well be a better industry for it. It's very high now in productivity and it's making money. But a lot of people have gone to the wall. A lot of people are out of work, and a lot of coal has been left in the ground that will never be got again.

Q. Before we leave the strike, tell us how it was resolved, how it came to an end.

A. Well, Scargill and his cronies couldn't bring the country to its knees. The industry had built up huge stocks at the power stations. They were absolutely overflowing. Obviously the government and McGregor had planned it this way. There is no doubt about it. They'd also got contracts for imported coal. It was coming in like nobody's business from America and Australia and South Africa. It was coming in from all over the world. Plus the fact that nobody knew about, they had an underground channel cable over from France.

Q. Tell me about that.

A. Yes, well, I don't believe for a moment that Scargill knew it was there. I didn't know myself until afterwards, but I was told that they had a string of nuclear power stations across the channel in France. And we were tapping into the French grid as well, so I was told. I'm certain it's right. But we built, again, tremendous stocks. A lot - it went on for 12 months, as you know. It was a whole year, and it was not very nice and a very traumatic time. I had various meetings with area personnel - secret meetings with Jim Cowan and Ian McGregor at Rothley, towards Quorn, about once a month to see what was happening and advising them, and I said that now it's started, we just cannot lose it because if you lose it then you give way to Scargill, and I can remember Ian McGregor also saying there's no way we can lose this one. No way. He said, "If we lose this, we've lost the country." It was as serious as that. And he said, "Mrs. Thatcher has made her mind up." I think there was probably one crucial time when there was all the mass picketing, when police had been injured, men were being killed on picket lines and a lot of injuries taking place and the media, of course, were all over - television showing injuries and that sort of thing. It was probably touch and go then and, of course, questions and uproars in the House of Commons. There was, I think, probably one precarious period about half way through but after that was over then it was downhill all the way. And of course the area executives said, "The end's the end, that's it, twelve months, it's finished, go back to work lads." And that started it. That led to what we have now. We've got a much smaller industry now.

Q. Scargill still held out even to the bitter end, didn't he?

A. Oh yes. Mick McGahey went against Scargill as well during the later part of the strike but he retired, he finished before the strike ended. That was his vice president, he finished. And the area executives then were starting to say that we are getting nowhere with this one - and he was overturned in the end and of course he said, "All I've told you before the strike has all come true - they have shut all the pits." But having said that, there wouldn't have been such closures in my view if they had sat down and negotiated properly like Joe Gormley would have done. There would have been closures like the Leicestershire coalfield, in Leicestershire coalfield there's only one mine left, but it was planned and it was done properly. And then I retired, when I was coming up to 60. I finished, I'd had enough. But no regrets, I've had a wonderful life, wonderful experiences, a lot of traumatic experiences, and you certainly don't want to know about any near misses I've had. I don't want to tell about them. I've had a few in my life but that's another story.

20. EPILOGUE

Q. Looking back, again, in retrospect to the time when you started at Skellyton colliery operating the pan run, you've seen really the development of longwall mechanization from its very early days through the highly automated systems that are operating now. It's quite a story, Jim.

A. Yes, when you think back on the longwall face, the total number of men employed, even when we first started on conveyors on the pan run, putting packs on, filling off - you were talking about some 50 men per face, producing probably about 150 tons a day, whereas now you've got about 4 or 5 men producing 5,000 to 6,000 tons a day on a face. That's the situation we've got to now. Bagworth has just got one face, one face left in the pit, and that will finish at the end of this year. One face has produced 15,000 tons in five days from one face with about 6 men on a face per shift. And that's where we've got to. In the future, I can't envisage anything any better for extracting coal than we have now, with all the modern systems we've got. I may be old fashioned but I can't see it. I've had a good working life, it's been hard - but I hope to see, I will probably never see it, but I hope it will come to pass that one day we shall have sufficient energy elsewhere that men don't have to go underground and get coal out of a hole in the ground. It will happen one day because the reserves will run out, but I'm certain while there is coal to be got as an energy source, it will be got. But it's a hard life, even in modern mining it's a hard life. It's a very happy life at times, as you well know, Malcolm. Miners are a close knit work force. They help each other, they're the salt of the earth, miners are. And they'll do anything for you if you treat them right, I've always found that. But I hope one day that men won't have to go underground like moles and work in these sorts of places if we can get the energy elsewhere.

Q. As you've said, we're almost at that point now with so few men on the face, that we're heading towards manless mining, manless faces. That's been already achieved in fact.

A. Well we've achieved that, experimentally, at a great financial cost. You still have to have somebody to look at it and supervise and watch it. Yes, that will probably come, but even with manless faces people will still have to go underground unless you can build machines and robots that will go down the shaft and do inspection and maintenance. That may well come, I don't know. It's not beyond the realms of possibility.

Q. Or, even extracting the energy without getting the coal out of the ground by liquefaction or some similar means.

A. That's right, I'm all for that. I'm all for getting energy no matter from what source it comes that will stop men having to go down a hole in the ground. And that applies to all forms of mining - metal mining, the lot. But people are great adventurers in life and that's a good thing, I suppose. We would never be where we are in this world if we weren't adventurers, would we?

Q. What would you say to young people who are contemplating a career in mining engineering? Is there sufficient future in mining engineering - I'm talking about mining as a whole now - including metal mining, all forms of mining. Looking back on your career, you've said it's been hard but it's been worthwhile, great people, but there's that note of doubt in your voice about the whole future of mining as an engineering profession.

A. Well, as I've said, Malcolm, I think that whilst there is energy in the ground whether it be in the form of coal or other forms of energy, while there are precious metals in the ground or materials you need for other purposes, I think people will go and mine them. I think it's just part of us. It's there and we'll go after it. It's like they go down from rigs in the North Sea for oil, it's like they're now going down to the depths of the ocean after things. I think it's an adventure, it's there, humans being what they are, they will go after it, and if I had my time all over again I would probably do exactly the same. I don't know, I probably would. As I've said, there were a lot of hard times but there were good times as well. I have a lot to be thankful for.

The mining fraternity are the salt of the earth. You get the odd sod here and there, as you go through, but you sort them out, but on the whole, yes, if you ask me if I had a son and he said to me, "I want to be a mining engineer.", I would advise him against it. I think all fathers do that. Our father advised us not to go down the pit. Because it's a hard life. I think if you're good enough - I mean, we all can't be colliery managers and we all can't be area production managers - you've got to have people from when they leave school until they retire at 60 or 65, who are going to work every day down in a coal mine. Now if that's all that is for them, well alright - and, again, if the rewards are right for doing it, and that's the point that I made about the Joe Gormley strike - the rewards weren't there, that's why we got the strike, a national strike.

If the rewards are there for them to go and do that job, well fine, that's their choice. As you know, Malcolm, as well as I do, there's a great camaraderie underground in a coal mine. If anyone is in any danger or if anyone needs help, they go out of their way, they'll do anything to help you.

As I have already said, all I wanted to be was a colliery manager, that was my happiest time. I was offered further promotion but turned it down, it meant moving from Leicestershire and I was not interested. Looking back to the old days, being a undermanager and colliery manager was a much more exacting job than it is today. You had less staff and, as such, it was a 7-day week, 24-hours per day job.

My one regret is to Iris and our girls. I never saw my girls grow up, never got involved in their education or their recreation. It was mainly because of the profession I had chosen, and having done so I had to give it my all. I wanted to succeed and in doing so make a better life for us all.

Q. Well, thanks, Jim, that is some story. You deserve a drink now.

A. Well, we both do. Do you want a beer?

APPENDICES--Malcolm J. McPherson and James McPherson

A. Program, Tenth Annual Presidential Address and Banquet of the University of California Mining Association, 1991 307

B. Vitae and list of publications, Malcolm J. McPherson 308

Appendix A

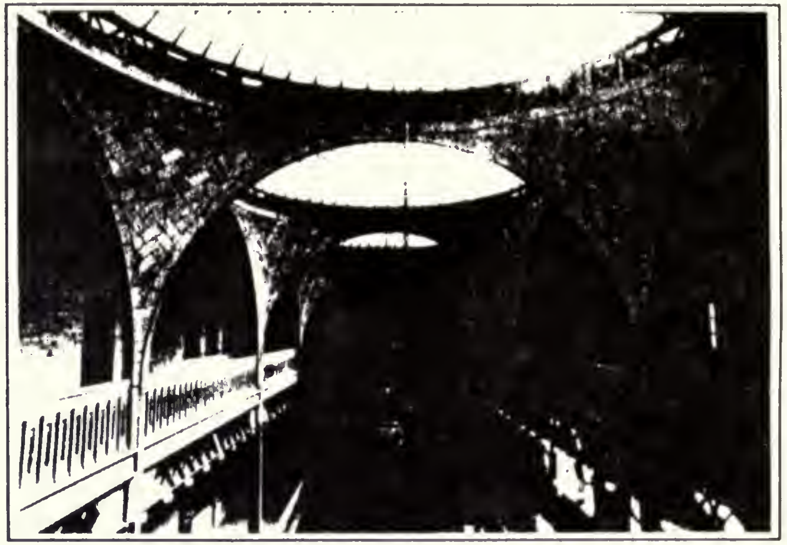
Officers of the U.C. Mining Association:

Honorary President:	Mr. Robert R. Beebe
Student Presidents:	Mr. Christopher J. Wyatt Mr. Mitchell A. Yee
Vice President :	Ms. Janet Grimes
Secretary:	Mr. Eric Wang
Treasurer:	Mr. Bobby Nomoto
Engineers Joint Council Reps:	Mr. Hassan Fattah Mr. Stephen W. Kan
Historians:	Mr. Hany Lansing Mr. Eric Vandeburgt Mr. Glen Emert
Faculty Advisor:	Prof. Malcolm J. McPherson

Past Honorary Presidents & Student Presidents:

1982	Mr. Donald McLaughlin & Keith Wallace
1983	Mr. Plato Malozemoff & Alexander Wilson
1984	Mr. Alexander Wilson & Edward Stanek
1985	Mr. Harry Conger & Thomas Zamzow
1986	Mr. John Havard & James Polek
1987	Mr. Simon Strauss & Aaron Middlebrook
1988	Mr. Wallace Macgregor & Su-San Wen
1989	Mr. Brian Tucker & Thomas Kunysz
1990	Mr. John Neerhout, Jr. & ChristopherWyatt
1991	Mr. Robert R. Beebe & Mitchell A. Yee

Menu Design And Photographs
By
Hassan Fattah



The
Tenth Annual Presidential Address
and
Banquet
# of the
University of California
Mining Association

Friday, April 19, 1991

The Men's Faculty Club
of
The University of California
at Berkeley

MALCOLM J. McPHERSON

EDUCATION:

National Certificate in Mining Engineering (Distinction), Coalville Mining and Technical College, England.
B.Sc. (1st Class Honors), Mining Engineering, 1962 and Ph.D., Mine Ventilation, University of Nottingham, England, 1965.

PROFESSIONAL AFFILIATIONS:

Chartered (Registered) Engineer (U.K. and member countries of E.E.C.), 1968.
Fellow and Council Member, Institution of Mining Engineers.
Fellow, Institution of Mining and Metallurgy.
Fellow, Mine Ventilation Society of South Africa.
Distinguished Member, American Institute of Mining, Petroleum and Metallurgical Engineers.
Member, American Society of Heating, Ventilating and Air Conditioning Engineers.

AREAS OF EXPERTISE:

Ventilation and air quality surveys, ventilation network analysis, design and planning of large underground ventilation and air-conditioning systems, psychrometric analyses, methane drainage, gas control, dust control, thermodynamics, fluid mechanics and computer modelling.

SPECIAL QUALIFICATIONS AND HONORS:

Recognized expert in mine ventilation and air conditioning design since 1965. Received the Sam Mavor Prize of the Institution of Mining Engineers in 1965 for paper on "Ventilation Network Analysis by Digital Computer" (this paper heralded the work that was to revolutionize mine ventilation planning); received the Gold Medal of the Mine Ventilation Society of South Africa in 1972 (this award is regarded internationally in the field of mine ventilation and was presented for work on the thermodynamics of fan testing); a founder member of the South African National Committee for the organization of the first International Ventilation Congress held in Johannesburg, 1975; member of the International Committee for the Congress on Mine Ventilation since 1975; keynote speaker at the 1988 Congress in Brisbane, Australia; received the Silver Medal of the Institution of Mining Engineers in 1977 for contributions to knowledge in mine ventilation and air conditioning; appointed as the Henry Krumb Lecturer by the Society of Mining Engineers of AIME, 1982-83; received the Consolidated Goldfields Gold Medal awarded by the Institution of Mining and Metallurgy (London) in 1982 for paper on Environmental Planning at Cleveland Potash Ltd.; elected to the U.S. National

Committee (National Research Council) on Advanced Tunneling Technology in 1983; elected to the AIME (SME) U.S. National Committee on Underground Ventilation in 1983 (Chairman, 1988); Distinguished Member Award of the Society of Mining Engineers of AIME, 1989; H.L. Hartman Award (1991) of SME for outstanding service in the field of mine ventilation.

POSITIONS HELD:

1981 - : Professor of Mining Engineering, University of California, Berkeley.

1983 - : President, Mine Ventilation Services, Inc.

1978 - 1981: Reader in Mining Engineering (Senior Professor with special responsibility for research), University of Nottingham.

1974 - 1978: Senior Lecturer in Mining Engineering, University of Nottingham.

1964 - 1974: Lecturer in Mining Engineering, University of Nottingham.

1953 - 1958: Underground worker, junior management positions and mine rescue brigadesman, National Coal Board, England.

MAJOR RESEARCH INTERESTS:

- Mine Ventilation System Design - Work of McPherson in 1964 and 1965 was instrumental in the United Kingdom becoming the first country to utilize digital computers for the planning of mine ventilation systems. The technique developed had a major impact on the scale, quality and economics of ventilation planning and is now common practice throughout the world. Work in this field has continued and widened with the further development of simulation programs to assist in the planning of integrated mine systems. Strong emphasis has been placed on the practical application of such programs and involvement of industrial personnel in correlation and user trials. This philosophy has led to considerable commercial success of the programs. Further work from 1980 has resulted in interactive and graphics orientated programs being developed for microcomputers.

- Methane Emission and Control - McPherson's work in this area has ranged from fundamental studies of adsorption of methane in coal and migration of the gas through fracture networks, to the design of methane drainage systems. The behavior of emitted methane within mine ventilation layouts and gas outburst phenomena have also been investigated.

- Subsurface Climate - McPherson has led several research projects concerned with the thermodynamic and psychrometric behavior of air in underground openings. These have involved studies of heat/mass transfer through strata and at rock surfaces, effects on the mine climate and physiological reactions of personnel.

- Thermodynamics and Fluid Mechanics - Many of McPherson's research interests are centered around the basic engineering disciplines of thermodynamics and fluid mechanics. Examples include the evolution of testing procedures for large fans passing mixtures of air and water, the thermodynamic analysis of mine ventilation systems and multi-phase flow through fractured media.

- Computer Modelling - Since his pioneering work on computer simulations of mine ventilation networks in the 1960's, McPherson has continued to develop and utilize computer models for other physical systems.

- Nuclear Waste Isolation - Since 1978, McPherson has been involved in research projects associated with the development of geologic repositories for high-level nuclear waste. These have ranged from site characterization to investigations of airflow and climate control.

TEACHING:

Courses taught for more than two years:

University of Nottingham

Engineering drawing and graphics (1965 to 1975)
Applied fluid mechanics and thermodynamics (1966 to 1968)
Mechanics and thermodynamics of mine ventilation (1966 to 1981)
Mine environmental engineering (1971 to 1981)
Computer science (1967 to 1971)
Computer utilization in the Minerals Industries (1970 to 1981)
Petroleum reservoir engineering (1971 to 1981)

University of California, Berkeley

Fundamentals of mining engineering (1981 to 1985)
Methods of mining (1986 to -)
Mine ventilation planning (1981 to -)
Advanced mine ventilation engineering (1982 to -)
Hazards in the mine environment (1982 to -)

UNIVERSITY ADMINISTRATION

Throughout his academic career, McPherson has undertaken a full complement of administrative duties associated with teaching, research and university governance. The following examples are restricted to some of those assignments at the University of California, Berkeley.

- Undergraduate Advisor in Mineral Engineering

- Academic Plan Committee (Chairman): responsible for planning future academic programs and faculty requirements in Mineral Engineering

- Mining and Mineral Resources Committee

- University Fellowships Committee

- Academic Affairs Committee (Chairman 1986-'90): responsible for departmental control of graduate and undergraduate student advancement and program planning

- College of Engineering Committee on undergraduate admissions

- Space Assignments and Capital Improvements Committee: a high-level campus committee charged with governing space assignments made to departments, and the control and planning of all major building projects

- Faculty Advisor to the University of California Mining Association (SME Student Chapter)

SELECTION OF INDUSTRIAL CONSULTANCIES

Dr. McPherson has engaged in consultancy work since 1965 in a number of countries and, particularly, in North America since 1981. The following non-comprehensive list outlines some of that work.

- Sunnyside Mine Number 3, Kaiser Steel Corporation, Sunnyside, Utah. Performed a sixteen year ventilation planning exercise of this gassy coal mine. This work resulted in savings of $4M planned capital investment in an unnecessary new shaft and further substantial savings in ventilation operating costs.

- Thompson Creek Mine Number 1, Snowmass Coal Company, Carbondale, Colorado. Managed a study to investigate the ventilation characteristics of a longwall district. Work was in conjunction with a U.S. Department of Energy study.

- U.S. Bureau of Mines, Department of Interior. Performed field studies at the Sunnyside Mine Number 3 to investigate the pressure/volume characteristics of twin development headings with auxiliary and brattice line face ventilation.

- Carbonifera de Nueva Rosita, Mexico. Complete system design for ventilation of an extremely gassy coal mine. Studies incorporated the development of a methane drainage system, a new shaft and a rock mechanics study.

- Taquari Vassouras Mine, Petrobras Mineracao, Aracaju, Brazil. Principal Investigator for a ventilation and air conditioning project at this hot potash mine. Carried out a complete ventilation and psychrometric survey of the mine. Future ventilation and refrigeration requirements were evaluated.

- Cape Breton Development Corporation, Nova Scotia, Canada. Analysis of ventilation systems and future ventilation planning for two large and gassy undersea coal mines.

- Coal India Ltd. (in association with British Mining Consultants), India. Field studies and investigations into feasibility of introducing mechanized longwall faces into deep coal mines then operating the room and pillar system.

- National Coal Board, United Kingdom. Numerous studies involving computerized ventilation planning, fan testing, gas outbursts, methane drainage and air cooling.

- British Gypsum, United Kingdom. Chief Consultant on mine ventilation. Responsible for reorganization of ventilation involving new shafts and fan systems at several gypsum mines operating the room and pillar system. Investigation into air blasts resulting from sudden pillar collapse.

- Cleveland Potash Ltd., United Kingdom. Chief consultant on mine ventilation. Responsible for ventilation planning procedures, investigations into gas outbursts and the design of air cooling systems.

- Billie Mine, American Borate Company, Death Valley, California. Ventilation planning for multi-level borax mine involving sizing for new shaft. Ventilation analyses for the temporary stand-by operation of the mine.

- Chamber of Mines of South Africa, South Africa. Establishment of computer based ventilation and cooling planning procedures for deep level gold mining. Ventilation planning exercises for individual mines. Introduction of thermometric methods of testing fans that are passing water/air mixtures (Gold Medal of the Mine Ventilation Society of South Africa awarded for this work).

- El Teniente Mine, Codelco-Chile, Chile. Complete study on the current and future ventilation systems at El Teniente, one of the largest underground complexes in the world. Integral part of the larger study, conducted in association with Ralph M. Parsons/Davy McKee Corporations.

- Polaris Mine, Cominco, Ltd., NWT, Canada. Review of study and advice on cooling of intake air to sub-zero temperatures during the summer months to prevent weakening of permafrost pillars in a high arctic lead/zinc mine.

- Prospective Nuclear Waste Repository in Volcanic Tuff, Department of Energy (Sub-contract with Parsons Brinckerhoff Quade and Douglas), Nevada Test Site, Nevada. Review the designs of underground ventilation/cooling systems during conceptual study for a proposed nuclear waste repository in volcanic tuff.

- Prospective Nuclear Waste Repository in Volcanic Basalt, Department of Energy (Sub-contract with Kaiser Engineers/Parsons Brinckerhoff Quade and Douglas (a joint venture)), Hanford, Washington. Review and design of ventilation systems for a proposed underground nuclear waste repository in basalt as part of the Basalt Waste Isolation Project (BWIP). Performed detailed investigations in ventilation design and climate prediction for the BWIP exploratory shaft and facility.

- Nevada (Nuclear) Test Site. Development of operating procedures for ventilation and air quality control systems in underground excavations.

- Mount Isa Mines, Queensland, Australia. Development of a 10 year plan in Research and Development to prepare the mine for working at much deeper levels. Initiation of on-site computerized ventilation planning procedures.

- Newmont Mining Company. Feasibility study on ventilation and air-conditioning for a proposed gold mine in Nevada. This orebody exists in an area of geothermal activity and presents exceptional environmental problems associated with high temperature rock and large potential inflows of hot water.

- U.S. Steel. Ventilation planning studies involving the redesign of the ventilation system of a large, complex and gassy coal mine in Alabama. These studies included the positioning and size optimization of new shafts.

			out of 7.0			
			McPherson		Dept Average	
Term	Course No	Course title	Course	Instructor	Course	Instructor
F78	MinlE 298	Grad.Mine Vent.	7.00 *	7.00 *	-	-
F81	MinlE 111	Mining methods	6.46 *	6.42 *	5.31	5.32
Sp81	MinlE 115	Mine ventilation	6.78 *	7.00 *	-	-
Sp82	MinlE 215	Mine env. eng.	6.87 *	7.00 *	6.19	6.25
F82	MinlE 111	Mining methods	6.5 *	6.4 *	5.3	5.5
W83	MinlE 115	Mine ventilation	6.71 *	6.85 *	5.9	6.1
Sp83	Minle 216	Hazards in mine env.	6.50 *	6.66 *	5.83	5.92
F83	MinlE 120	Mine ventilation	6.75	6.75 *	5.67	5.65
F83	MinlE 100	Mining methods	6.14	6.42		
Sp84	MinlE 222	Mine env. eng	6.9 *	6.9 *	5.5	5.4
F84	MinlE 120	Mine ventilation	6.8 *	6.5 *	5.3	5.1
F84	MinlE 100	Mining methods	6.2	5.5		
Sp85	MinlE 224	Hazards in mine env.	6.8 *	6.6 *	5.4	5.5
F85	MinlE 120	Mine ventilation	6.0 *	6.0	5.0	5.2
F85	MinlE 100	Mining methods	5.5	6.0		
Sp86	MinlE 222	Mine env. eng	5.1	5.9	5.5	5.6
F86	MinlE 120	Mine ventilation	5.1	5.3	5.2	5.4
F86	MinlE 100	Mining methods	5.7	6.3 *		
Sp87	MilE 224	Hazards in mine env.	5.7	6.0	5.2	5.3
F87	MinlE 100	Mining methods	5.6	6.0	5.2	5.4
F87	Mine ventilation		6.7 *	7.0 *		
1988	Sabbatical Year					
Sp89	MinlE 100	Mining methods	5.7	6.3	4.9	5.1
F89	MinlE 120	Mine ventilation	7.0 *	7.0 *	4.6	4.6
F89	MinlE 222	Mine env. eng.	7.0 *	6.5	5.3	5.3
Sp90	MinlE 101	Mining methods	7.0 *	7.0 *	4.8	5.0
F90	MinlE 120	Mine ventilation	6.7 *	6.7 *	5.1	4.9
F90	MinlE 224	Hazards in mine env.	6.3 *	6.7 *	5.1	5.1

* Highest evaluation in the Department of Materials Science and Mineral Engineering.

Malcolm J. McPherson: Teaching evaluations at the University of California, Berkeley.

LIST OF PUBLICATIONS AND PAPERS

Professor Malcolm J. McPherson

* 1. "The Measurement of Fan Performance" (jointly with F.B. Hinsley). Colliery Guardian, August 1, 1963. (Republished in the Journal of the Mine Ventilation Society of South Africa, April 1964.)

* 2. "Thermometric Testing of Fans" (jointly with F.B. Hinsley). Heating and Ventilation Engineer, October 1963. (Republished in the University of Nottingham Mining Magazine, October 1964.)

* 3. "Gyroscopic Correlation" (jointly with D.J.Hodges). Colliery Guardian, May 15, 1964. (Republished in the University of Nottingham Mining Magazine, October 1964.)

* 4. "Mine Ventilation Network Problems," Colliery Guardian, August 21, 1964.

* 5. "On the Threshold," Chairman's Address to the Midland Counties Institute of Engineers, Junior Section. The Mining Engineer, January 1966.

* 6. "Ventilation Network Analysis by Digital Computer," The Mining Engineer, November 1966. (Awarded Sam Mavor Prize of the Institution of Mining Engineers.)

* 7. "Digital Computation of Ventilation Networks," Nottingham University Mining Magazine, October 1966.

* 8. "Mine Ventilation Thermodynamics - Entropy Approach," Nottingham University Mining Magazine, October 1967.

* 9. "A New Treatment of Mine Barometer Surveys," The Mining Engineer, October 1969.

* 10. "Movement of Firedamp within the Floor Strata of a Coal Seam Liable to Outbursts" (jointly with E.F. Wolstenholme and L.H. Morris). The Mining Engineer, June 1969.

* Publications in refereed journals
** Reports and other publications
† Abstracts and papers presented at meetings
†† Co-authorship of books

* 11. "The Application of Computers in Mine Ventilation," The Mining Engineer, February 1970. Discussion March 1971.

* 12. "Investigations into Outbursts of Firedamp from the Floor Strata of the Silkstone Seam in South Yorkshire" (jointly with G.C. Oldroyd and L.H. Morris). Presented to the Manchester Geological Society, April 1970. The Mining Engineer, June 1971.

* 13. "Firedamp Outbursts and Flow Nets," University of Nottingham Mining Magazine, Vol. 21, 1969.

** 14. "Neo-transistorized Vane Anemometer" (jointly with A.A. Mahdi). Instrument Practice, June 1970.

* 15. "The Analysis of Borehole Measurements in the Detection of Potential Methane Outbursts in Coal Mines" (jointly with A.A. Lockett). The Mining Engineer, October 1971.

* 16. "The Metrication and Rationalization of Mine Ventilation Calculations," The Mining Engineer, August 1971. Discussion May 1972.

* 17. "The Isentropic Compression of Moist Air in Fans," Journal of Mine Ventilation Society of South Africa, June 1971. Discussion February and March 1972. (Awarded the Gold Medal of the MVS.)

** 18. "An Introduction to Automatic Control of Mine Ventilation Systems" (jointly with A.A. Mahdi). Mining Technology, May 1971.

* 19. "Monitoring Computer Applications in Mine Ventilation," A Special Lecture. Journal of the Mine Ventilation Society of South Africa, January 1972.

* 20. "The Changing Techniques of Ventilation Planning," The Mining Engineer, August 1974.

* 21. "The Occurrence of Methane in Mine Workings," Journal of the Mine Ventilation Society of South Africa, August 1975.

* 22. "The Resistance of Mine Airways," Journal of the Mine Ventilation Society of South Africa, October 1975.

* 23. "Refrigeration in South African Gold Mines," The Mining Engineer, February 1976.

* 24. "The Heat Problem Underground with Particular Reference to South African Gold Mines," Presented by invitation at the Annual Joint Meeting of the Institution of Mining Engineers and the Institution of Mining and Metallurgy, London, January 1976. Published (i) Mining Engineer, April 1976; (ii) Trans. Inst. Mining and Metallurgy, April 1976; (iii) Mining Magazine (digest), May 1976. (Awarded the Silver Medal of the IME.)

* 25. "Psychrometry - the Measurement and Study of Moisture in Air," University of Nottingham Mining Magazine, 1979.

* 26. "A Barometric Survey of the Shafts at Boulby Mine, Cleveland Potash Ltd.," Trans. Inst. Mining and Metallurgy, January 1980.

* 27. "Underground Environmental Planning at Boulby Mine, Cleveland Potash, Ltd." (jointly with G. Robinson and R.C. Weller). Joint meeting of Institute of Mining Engineers and Institute of Mining and Metallurgy, London, January 1982. Transactions Inst. Min. and Met., July 1981. (Awarded Consolidated Goldfields Gold Medal.) Reprinted July in The Mine Ventilation Society of S. Africa, Vol. 35, No. 9, Sept. 1982.

** 28. "Mine Ventilation Planning," Forefront, University of California, December 1981.

** 29. "Thermometric Testing of Fans," Ph.D. Thesis, University of Nottingham, 1965. (Vol. 1, 242 pp.; Vol. II, 250 pp.)

† 30. "Computer Utilization for the Undergraduate," Proc. of the Ministry of Public Buildings and Works Conference on Construction, Education and the Computer, Cambridge, 1968.

† 31. "The Automatic Control of Airflows in Mines" (jointly with A.A. Mahdi). International Conference on Automation and Collieries, Hungary 1971.

** 32. "The Simulation of Airflow Patterns in Gold Mine Stopes," Chamber of Mines of South Africa, Research Report 49/71, September 1971.

† 33. "Mine Environmental Engineering," United Nations Inter-Regional Seminar on Advanced Mining Technology, Ottawa, May 1973.

** 34. "The Development of Simulation Programs for the Prediction of Airflow and Wet Bulb Temperature Patterns in Gold Mine Stoping Systems," Chamber of Mines of South Africa Research Report, June 1975.

† 35. "The Simulation of Airflow and Temperature Distribution in the Stopes of South African Gold Mines," International Mine Ventilation Congress. Johannesburg, September 1975.

† 36. "Steady-State and Non-Steady-State flows of Compressible Fluids through Sorptive Porous Media" (jointly with T.S. Sowier and L.H. Morris). Scientific Society of Mechanical Engineers, Gyor, Hungary, October 1975.

† 37. "The Application of Computers to Environmental Planning for Underground Mines," International Conference on the Application of Computers in the Minerals Industries, Pennsylvania, U.S.A., October 1976.

** 38. "A User's Manual for the TMPNET Simulation Program," Chamber of Mines Research Report, October 1976.

** 39. "The Place of Dust Control in Mine Environmental Planning," Report to the American Academy of Sciences, Washington, D.C., U.S.A., November 1978.

† 40. "Air Pressures Developed in Collapsing Mine Workings," International Mine Ventilation Congress, Reno, U.S.A., November 1979.

** 41. "Mine Ventilation Planning," All India Symposium on Mine Environmental Engineering, Dhanhbad, India, February 1981.

** 42. "Ventilation Planning for Underground Coal Mines" (jointly with M. Hood). Report to U.S. Department of Energy, October 1981.

** 43. "Mine Ventilation Planning - A Case Study" (jointly with M. Hood). Lawrence Berkeley Laboratory Earth Sciences Division Annual Report, 1981-82.

** 44. "Stripa - The Ventilation Experiment," Report to Lawrence Berkeley Laboratory Earth Sciences Division, September 1981.

** 45. "The Use of Ventilation to Measure Water Inflow into an Underground Room," Lawrence Berkeley Laboratory Earth Sciences Division Annual Report, 1981-82.

† 46. "Sunnyside No. 3. A Case Study in Ventilation Planning" (with M. Hood). AIME Ventilation Symposium, Alabama, March 1981.

†† 47. "The Analysis of Airflow Duct Networks by Digital Computer" (Elsevier) - Section entitled Air Conditioning System Design For Buildings, Elsevier, London, 1969.

†† 48. "The Ventilation of South African Gold Mines" (published by the Chamber of Mines of South Africa) - Major section on Ventilation Network Analysis and Planning, 1974.

†† 49. Computer Methods for the 80's. A major section entitled, "Underground Mine Environment Monitoring and Control," Published by the American Institute of Mining Engineers, 1979.

†† 50. "Environmental Engineering in South African Mines" (published by Mine Ventilation Society of South Africa), Ch. 8 Ventilation Network Analysis, 1983.

** 51. "The Viscous Flow of Air Through Narrow Tube Systems," National Coal Board, 1971.

** 52. "Mine Ventilation Economics" (with K.G. Wallace) Report to the U.S. Dept. of Energy, Sept. 1982.

†† 53. "Use of Diesel-Powered Equipment Underground," Diesels in Mining. World Mining/World Coal, November 1982.

* 54. "Diesels in Underground Mines," Indian Mining and Engineering Journal Vol. XXI, No. 4, 1982.

** 55. "An Investigation into the Ventilation Characteristics of a Longwall District in a Coal Mine" (with D.J. Brunner). Final Report to DOE, Sept. 1983.

** 56. "Ventilation Requirements and Prediction of Climatic Conditions in the Hanford Exploratory Shaft and Drift," Report to KE/PB, October 1982.

** 57. "Measurement of Water Inflow to the Large-Scale Hydrology Test Room, Hanford Exploratory Drift," Report to the Lawrence Berkeley Laboratory, November 1982.

** 58. "Measurement of Low Rates of Water Inflow by Monitored Evaporation in the Large-Scale Permeability Experiments at Stripa," Report to the Lawrence Berkeley Laboratory, September 1982.

† 59. "The Efficiency and Economics of Mine Ventilation Systems" (jointly with K.G. Wallace). AIME Meeting, Atlanta, Georgia, Spring 1983.

** 60. "Prediction of the Performance of a Partial Airflow Recirculation System in the Large Scale Hydrology Test Room," Hanford, BWIP Exploratory Shift Program, Report No. 2, LBL, March 1983.

* 61. "Large Scale Hydraulic Conductivity Measurements From Radial Flow into an Underground Opening in Fractured Granite" (with C. Wilson et al), International Journal of Rock Mechanics, Vol. 20, No. 6, pp 269-276, 1983.

** 62. "Advances in Fossil Energy: Coal Mine Ventilation Systems," Earth Sciences Division, LBL, Annual Report 1980.

** 63. "The Efficiency and Economics of Mine Ventilation" (with K.G. Wallace): Parts 1 and 2, LBL Earth Sciences Annual Report, 1983.

** 64. "Technical Study on the Ventilation Characteristics Along a Development Heading" (with K.G. Wallace). Report to U.S. Bureau of Mines, June 1983.

† 65. "The Effect of Face Resistance on Airflow Characteristics Along a Twin Development Heading" (with K.G. Wallace & F. Kissell). AIME Spring Meeting, Los Angeles, 1984.

** 66. "The Role of Mine Ventilation in Selecting Sites for Underground Nuclear Waste Repositories," International Mine Ventilation Congress, Harrogate. Proceedings published by the Institution of Mining and Metallurgy, U.K., June 1984.

* 67. "The Effect of Gas Evacuation on Coal Permeability Test Specimens" (with S. Harpalani). Int. J. Rock Mech. Min. Sc. and Geomech. Vol 21, No 3, pp 161-164, June 1984.

* 68. "A Direct Relationship between Sigma Heat and Wet Bulb Temperature," Journal Mine Ventilation Society of South Africa. Vol. 37, No. 6, June 1984.

*† 69. "Determination of Design Parameters for the Improved Planning of Airflow and Climate in Underground Mines" (with P. Mousset-Jones). Generic Mineral Institute Annual Workshop, Virginia Poly. Inst. and State Univ., Nov. 1983.

** 70. "The Permeability and Adsorption Characteristics of Coal" (with S. Harpalani). Report to U.S. Steel Corp. and the Gas Research Institute, Aug. 1984.

*† 71. "Measurement of In-Situ Thermal Parameters in an Underground Mine" (with P. Mousset-Jones). Generic Research Institute (Mining Systems) Annual Workshop, Reno, Nov. 1984.

* 72. "Mine Ventilation Planning in the 80's," International Journal of Mining Engineering, Sept. 1984. (Vol. 2, pp. 185-227.)

*† 73. "Background Theory of the Heat Balance at Rock Surfaces," Generic Research Institute (Mining Systems) Annual Workshop, Reno, Nevada, Nov. 1984.

† 74. "Teaching Mine Ventilation in the '80's," Keynote Address. Workshop on Teaching Mine Ventilation, Reno, Nevada, Sept. 1985.

* 75. "The Resistance to Airflow on a Longwall Face," 2nd U.S. Symposium on Mine Ventilation, Reno, Nevada, Sept. 1985.

* 76. "The Analysis and Simulation of Heat Flow into Underground Airways," The International Journal of Mining Engineering, Aug. 1986.

*† 77. "The Effect of Stress on the Permeability of Coal," 26th U.S. Symposium on Rock Mechanics, Rapid City, S. Dakota, June 1985 (with S. Harpalani).

*† 78. "The Effect of Gas Pressure on the Permeability of Coal" (with S. Harpalani), 2nd U.S. Symposium on Mine Ventilation, Reno, Nevada, Sept. 1985.

*† 79. "Measurement of In-Situ Values of Thermal Conductivity and Diffusivity in Two Hot Underground Mines" (with P. Mousset-Jones), International Bureau of Mining Thermophysics, Transactions, Bretby, England, May 1985.

* 80. "Temperature Rise in Water Pipelines," Journal of the Mine Ventilation Society of South Africa, Vol. 37, No. 5, pp 58-60, May 1984.

* 81. "Effect of Stress on Permeability of Coal" (with S. Harpalani), Quarterly Review of 'Methane from Coal Seams Technology,' Gas Research Institute. Vol. 3, No. 2, 1985.

* 82. "Retention and Release of Methane into Underground Workings" (with S. Harpalani), International Journal of Mining Engineering, 1986.

† 83. "A Survey of Booster Fan Use in Underground Mines," (with N. Dahr) Generic Institute on Mining Systems. Annual Workshop, Lexington, KY, Nov. 1985.

† 84. "Measuring In-Situ Rock Thermal Conductivity and Diffusivity," SME AIME Meeting, Albuquerque, NM, Oct. 1985.

† 85. "In-Situ Measurement of Thermal Transport Properties in an Underground Airway" (with P. Mousset-Jones), International Conference on Refrigeration. Johannesburg, South Africa, April 1986.

*† 86. "Simulating the Underground Climate Using a Microcomputer" (with P. Mousset-Jones), APCOM Conference, Penn. State, April 1986.

† 87. "The Impact of Using Auxiliary Fans on Mine Efficiency and Cost" (with K.G. Wallace et al), AIME Spring Meeting, New Orleans, March 1986.

* 88. "The Determination of In-Situ Thermal Properties and the Simulation of Climate in an Underground Mine" (with P. Mousset-Jones), Int. Jnl. of Mining and Geological Eng., Aug. 1986.

† 89. "The Mechanism of Methane Flow Through Solid Coal" (with S. Harpalani), 27th U.S. Rock Mechanics Symposium, Alabama, May 1986.

**† 90. "In-Situ Thermal Rock Properties Determined at the Sunshine Mine, Idaho" (with P. Mousset-Jones), USBM Generic Institute Workshop on Mining Systems, Lexington, Kentucky, Nov. 1985.

* 91. "The Effect of Controlled Recirculation on Methane Concentrations in Headings," Annual Trans. of Society of Mining Engineers of AIME, 1987.

† 92. "A Study of Booster Fans in the Simulation of Mine Ventilation Networks" (with M.S. Jones), Mineral Institute Generic Center on Mine Systems Annual Workshop, Moscow, ID, Oct. 1986.

* 93. "The Resistance to Airflow of Mine Shafts," 3rd US Symposium on Mine Ventilation, Penn. State, Oct. 1987.

† 94. "American Mining - Where are we Headed?," AIME Annual Meeting, Phoenix, AZ, Jan. 1988.

* 95. "Investigation of the Law of Airflow on a Longwall Face" (with D.J. Brunner), 3rd US Symposium on Mine Ventilation, Penn. State, Oct. 1987.

† 96. "A New Development in Microcomputer Software for Mine Ventilation Planning" (with M.S.J. O'Leary), AIME Annual Meeting, Phoenix, AZ, Jan. 1988.

† 97. "In-Situ Measurements of Thermal Transport Properties in Underground Airways Using the TSI" (with P. Mousset-Jones and G. Danko), Generic Institute on Mining Systems Annual Workshop, Moscow, ID, Oct. 1986.

* 98. "Development of an Improved Method to Measure In-Situ Rock Properties in a Single Drill Hole" (with G. Danko and P. Mousset-Jones), 3rd US Symposium on Mine Ventilation, Penn. State, Oct. 1987.

† 99. "Heat Transfer and Pressure Drop Correlations in Underground Airways" (with G. Danko and P. Mousset-Jones), Generic Institute on Mining Systems Annual Workshop, AL, Oct. 1987.

* 100. "Heat Transfer in Mine Airways with Natural Roughness" (with P. Mousset-Jones and G. Danko), 3rd US Symposium on Mine Ventilation, Penn. State, Oct. 1987.

† 101. "The Effect of Recirculation on the Mine Climate" (with N. Dhar), Generic Institute on Mining Systems Annual Workshop, AL, Oct. 1987.

* 102. "An Algorithm for Selecting the Optimum Combination of Main and Booster Fans in Underground Mines" (with F. Calizaya), 3rd US Symposium on Mine Ventilation, Penn. State, Oct. 1987.

* 103. "Subsurface Environmental Engineering - A Look into the Future," Keynote Address, 4th International Congress on Mine Ventilation, Brisbane, Australia, July 1988.

* 104. "An Analysis of the Resistance and Airflow Characteristics of Mine Shafts," 4th International Congress on Mine Ventilation, Brisbane, Australia, July 1988.

* 105. "Ventilation Planning Study for the El Teniente Block Caving Mine in Chile" (with D.J. Brunner), 4th International Congress on Mine Ventilation, Brisbane, Australia, July 1988.

† 106. "Application of Graph Theory to Detect Uncontrolled Recirculation" (with F. Calizaya, G. Yang and P. Mousset-Jones), Proc. 4th Conf. on Use of Computers in the Coal Industry, WV, Balkema Publ., pp 99-109, 1990.

**107. "The Use of Booster Fans in Underground Coal Mines" (with F. Calizaya and P. Mousset-Jones), Final Report to Generic Mineral Tech. Center, 122 pp, 1990.

† 108. "A Process Control System for Evaluating the Operating Conditions of Booster Fans in Mines" (with F. Calizaya and P. Mousset-Jones), Proc. Inst. Machinery Monitoring and Diagnostics Conf., Las Vegas, NV, pp 644-650, 1990.

* 109. "Guidelines for Implementing a Booster Fan Monitoring and Control System in Coal Mines" (with F. Calizaya and P. Mousset-Jones), Proc. of 4th US Symp. on Mine Ventilation, Berkeley, CA, pp 382-391, 1989.

* 110. "Mathematical Modelling for Gas Concentration Transients in Controlled Flow Recirculation" (with G. Yang and F. Calizaya), Proc. 4th US Symp. on Mine Ventilation, Berkeley, CA, 243-252, 1989.

† 111. "The Use of Booster Fans in Underground Coal Mines" (with F. Calizaya), Proc. 7th Ann. Workshop, Generic Mineral Tech. Center, VA, pp 105-116, 1989.

† 112. "The Gob Effect on Transients in Gas Emission and Concentration" (with G. Yang), Proc. 7th Ann. Workshop, Generic Mineral Tech. Center, VA, pp 141-152, 1989.

† 113. "Air Temperature Calculation in Hot Airways" (with G. Danko and P. Mousset-Jones), 1st Canadian Conference on Computer Appl. in the Mineral Ind., Quebec, Canada, 1987.

† 114. "Sensitivity Analyses on Selected Input Parameters for Mine Climate Simulation Programs" (with G. Danko and P. Mousset-Jones), AIME Meeting, AZ, 1988.

* 115. "A Computer Program for Selecting the Optimum Combination of Fans and Regulators in Underground Mines" (with F. Calizaya), 4th Int. Congress on Mine Ventilation, Brisbane, Australia, pp 141-150, 1988.

* 116. "An Experimental Investigation to Evaluate Gas Flow Characteristics of Coal" (with S. Harpalani), 4th Int. Cong. on Mine Ventilation, Brisbane, Australia, pp 175-182, 1988.

* 117. "Heat, Mass and Impulse Transport Analogies for Mine Airways" (with G. Danko and P. Mousset-Jones), 4th Int. Congress on Mine Ventilation, Brisbane, Australia, pp 237-248, 1988.

* 118. "The Phenomenon of Dust Deposition in Exhaust Ventilation Shafts at Inco Mines" (with J. Stachulak and E.D. Dainty), Conf. on Ind. Hygiene in Mines, W. Australia, 1990.

† 119. "Investigation of Dispersion Coefficients in Transient Airflows" (with G. Yang), 8th Ann. Workshop, Generic Mineral Tech. Center, Reno, NV, 1990.

† 120. "The Effects of Flow Direction on Friction Factor in Simulated Mine Openings" (with F. Calizaya and K. You), 8th Ann. Workshop, Generic Mineral Tech. Center, Reno, NV, 1990.

† 121. "Impact of Using Auxiliary Fans on Coal Mine Efficiency and Cost" (with K.G. Wallace, D.J. Brunner and F.N. Kissell), U.S. Bur. of Mines, RI9307, 1990.

** 122. "Subsurface Ventilation and Environmental Engineering," A major new textbook to be published by Chapman and Hall, 1991 (approx. 800 pp).

Other Publications:

The list of publications given above does not include a large number of abstracts, presentations at meetings, consultancy reports, reviews and contributions to discussions which have appeared in learned journals since 1964.

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